# FINAL REPORT CORNELL-DUBILIER BOUND BROOK REASSESSMENT SOUTH PLAINFIELD, NEW JERSEY

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## LIST OF ACRONYMS AND ABBREVIATIONS

AE assessment endpoint

AHH arylhydrocarbon hydroxylase AHR arylhydrocarbon receptor

AUF area use factor

BCF bioconcentration factor

BERA baseline ecological risk assessment

BW body weight

CDE Cornell-Dubilier Electronics Site

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

COPC contaminant of potential concern DSC DSC of Newark Enterprises, Inc.

dw dry weight g gram

EPA United States Environmental Protection Agency

ERA ecological risk assessment
EROD ethoxyresorufin-O-deethylase
GPS Global Positioning System

HQ Hazard Quotient kg/day kilograms per day

K<sub>ow</sub> octanol-water partition coefficient

LD<sub>50</sub> lethal dose to half of the exposed organisms

LOAEL lowest observed adverse effect level

mg/kg milligrams per kilogram

mg/kgBW/day milligrams per kilogram body weight per day

mi<sup>2</sup> square mile
NA not applicable
ND not determined
NJ New Jersey

NJDEP New Jersey Department of Environmental Protection

NOAEL no observable adverse effect level

NPL National Priorities List

OU operable unit

PAH polycyclic aromatic hydrocarbon PCB polychlorinated biphenyls

PCDD dibenzo-p-dioxins PCDF dibenzofurans

PRP primary responsible party

ppm parts per million

QA/QC quality assurance/quality control QAPP Quality Assurance Project Plan

REAC Response, Engineering and Analytical Contract

TCDD 2,3,7,8-tetrachlorodibenzo-p-dioxin TEC toxicity equivalency concentration

TEF toxicity equivalency factor TRV toxicity reference value

U not detected

UCL upper confidence limit up/kg microgram per kilogram

ww wet weight

% °C

percent degrees Celsius

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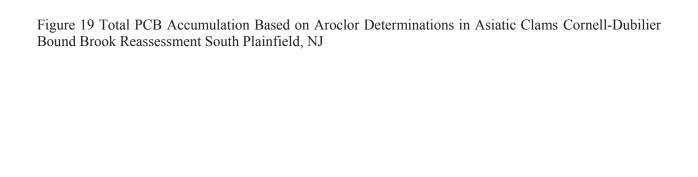
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#### **EXECUTIVE SUMMARY**

The Cornell-Dubilier Electronics (CDE) Site, located at 333 Hamilton Boulevard in South Plainfield, NJ, was a capacitor manufacturing facility that used polychlorinated biphenyls (PCBs). The 26-acre site is bounded on the northeast by the Bound Brook and the former Lehigh Valley Railroad, Perth Amboy Branch (presently Conrail); to the southeast by the Bound Brook and the South Plainfield Department of Public Works property; to the southwest, across Spicer Avenue, by single-family residential properties; and to the northwest, across Hamilton Boulevard, by mixed residential and commercial properties (EPA 2003).

A Site investigation was conducted with the objectives to:

- 1. determine the total PCB, PCB congeners and dioxin-like PCB concentrations in selected fish (sunfish and carp) and invertebrates (Asiatic clams), and compare with historical data from the Bound Brook;
- 2. re-establish the baseline concentrations of PCBs and dioxin-like PCBs in fish and invertebrate tissue within the Bound Brook for remedy effectiveness monitoring;
- 3. provide a fingerprint of the PCB congeners within the Bound Brook extending from the CDE Site to New Market Pond:
- 4. define the ecological receptors that actually exist in the Bound Brook system; and
- 5. provide a focused ecological risk assessment (ERA) to evaluate the current PCB risks to selected assessment endpoints;
- 6. and provide data for and support to Baseline ERA being conducted in the RI/FS.

Fish were collected along the Bound Brook system matching sampling locations and species, to the extent practical, to historical investigations. Comparisons of historical and current PCB concentrations found significant differences at some stations. Statistical results varied across the different fish species and tissue types (whole body and fillet). Confounding factors such as small sample sizes and varying species of sunfish complicated the analyses. However, for white sucker fillet tissue a significant difference in Aroclor 1254 accumulation was identified for all Stations included in the analyses between the 1997 and 2008 events, with lower mean concentrations in 2008. These findings suggest that the loading of PCBs into the Bound Brook has declined over the last 10 years.

The results of evaluations on PCB congener data through graphical representations, as well as the principal component analysis (PCA) and polytopic vector analysis (PVA), results in several findings. While all sampling locations generated PCB data identified as Aroclor 1254 and Aroclor 1248, and most contained Aroclor 1260. The data suggests that the origins and/or other fate and transport factors may not be the same throughout the study area. Results of the multivariate techniques indicate a spatial trend does exist within the Bound Brook PCB congener data set. A distinct change in percent contribution of congeners was noted between Station 1 (reference area) and Station 2 (adjacent to the CDE Site), between Stations 2 and 3 (immediately downstream of Station 2), and between Station 3 and the downstream locations. Differences in congener contributions between Station 1, and Stations 2 and 3 were expected since Station 1 was located upstream. Differences in percent contribution for Stations 2 and 3 were unexpected given that Station 2 is located adjacent to the CDE Site, while Station 3 was located only slightly downstream. It is also concluded that Station 7, Spring Lake, on the Cedar Brook also has a unique congener pattern.

The findings above support the following conclusions provided below.

- 1. The reference area utilized in this study is outside of the direct influence of the CDE Site.
- 2. Station 2 appears to contain a unique PCB congener pattern, representative of the CDE Site.

- 3. Station 3 has a unique PCB pattern which is the result of either an additional contributing source to the Bound Brook or the result of chemical fate and transport properties of the Bound Brook system. The data do not support conclusions regarding the relative strength of PCB sources (mass release rates). Additional efforts in interpretation of the existing data, such as evaluation of the congener patterns relative to degradation potential, may assist in distinguishing between the likelihood that the differences in congener patterns are a result of chemical fate and transport issues or may be the result of another PCB source near Stations 2 and 3.
- 4. The unique PCB congener pattern found in Spring Lake supports a conclusion that another PCB source may exist in the Cedar Brook drainage.

A wildlife survey conducted as part of this investigation conclusively determined that a mink population exists within the Bound Brook system as well as other wildlife. The survey documented wildlife utilization of the Bound Brook within the Site boundary by several species. Of interest was the identification of the presence of a fisher (*Martes pennanti*) in the study area during the wildlife survey. The survey suggested that while the mink population is likely centered upstream of the Site, wildlife are venturing into the Site (presumably to forage for food), as evidenced by the high track density at the Site. Given the large foraging area of mink, up to several miles of stream, it is plausible that mink do forage within the Site boundary.

The reassessment of ecological risk estimates supports the conclusion that substantive ecological risk does exist to fish and wildlife within the Bound Brook resulting from the CDE Site. It is concluded that ecological risk does exist from PCB exposure for all assessment endpoints evaluated in this focused ERA. This risk exists at the CDE Site and all downstream locations. Risk also exists in/from exposures in Spring Lake. Of particular concern is the risk to fish consuming mammals, such as mink, which are documented to be utilizing the Bound Brook system and may forage within the Site boundary. The site-related exposure to PCBs for these receptors may exceed severe effects exposure levels (SELs); which may result in overt impacts to these animals.

#### 1.0 INTRODUCTION

The Cornell-Dubilier Electronics (CDE) Site, located at 333 Hamilton Boulevard in South Plainfield, NJ, was a capacitor manufacturing facility that used PCBs. This fenced 26-acre site is bounded on the northeast by the Bound Brook and the former Lehigh Valley Railroad, Perth Amboy Branch (presently Conrail); to the southeast by the Bound Brook and the South Plainfield Department of Public Works property; to the southwest, across Spicer Avenue, by single-family residential properties; and to the northwest, across Hamilton Boulevard, by mixed residential and commercial properties (EPA 2003).

During its years of operation at the site (1936 to 1962), CDE manufactured electronic parts and components, including capacitors. It is reported that during that time, transformer oils were tested. It has been reported that during its operations, CDE dumped or buried PCB-contaminated materials and other hazardous substances directly onto the soil at the CDE Site. These activities led to widespread chemical contamination at the facility, as well as migration of contaminants to areas adjacent to the CDE Site. PCBs have been detected in groundwater, soil and in building interiors at the industrial park; at adjacent residential, commercial and municipal properties; and in the surface water and sediments of the Bound Brook (EPA 2003).

On August 27, 2008, the Response, Engineering, Analytical Support contract (REAC) for the US EPA/ERT received an initial work assignment (WA) requesting assistance in further evaluating the CDE Site. The primary objectives of this WA were:

- 1. determine the total PCB, PCB congeners and dioxin-like PCB concentrations in selected fish (sunfish and carp) and invertebrates (Asiatic clams), and compare with historical data from the Bound Brook;
- 2. re-establish the baseline concentrations of PCBs and dioxin-like PCBs in fish and invertebrate tissue within the Bound Brook for remedy effectiveness monitoring;
- 3. provide a fingerprint of the PCB congeners within the Bound Brook extending from the CDE Site to the New Market Pond;
- 4. define the ecological receptors that actually exist in the Bound Brook system; and
- 5. provide a focused ERA to evaluate the current PCB risks to selected assessment endpoints and provide data for a support to the Baseline ERA being conducted in the RI/FS.

Over the course of this investigation, potential source identification was explored using bar charts as a means of depicting the pattern/distribution of PCB congeners within each sample, and multivariate statistical techniques, including PCA and PVA. Statistical analyses were run blind (location of the individual sample stations within the Bound Brook were not revealed until statistical analyses were complete) to avoid bias which can be introduced by the individual running these multivariate techniques.

Comparisons were also made between the historical Aroclor data collected in 1997 and the current data collected in 2008.

## 1.1 Site Setting and History

The CDE Site, located at 333 Hamilton Boulevard in South Plainfield, NJ, was a capacitor manufacturing facility that used PCBs (Figure 1). The property is secured by a fence with posted warning signs that were installed during the site stabilization removal action initiated in July 1997. This fenced 26-acre site is bounded on the northeast by the Bound Brook and the former Lehigh Valley Railroad, Perth Amboy Branch (presently Conrail); to the southeast by the Bound Brook and the South Plainfield Department of Public Works property; to the southwest, across Spicer Avenue, by single-family residential properties, and to the northwest across Hamilton Boulevard, by mixed residential and commercial properties (EPA 2003).

During its years of operation at the site (1936 to 1962), CDE manufactured electronic parts and components, including capacitors. It is reported that during that time, transformer oils were tested. It has been reported that during its operations, CDE dumped or buried PCB-contaminated materials and other hazardous substances directly onto the soil at the CDE Site. These activities led to widespread chemical contamination at the facility, as well as migration of contaminants to areas adjacent to the CDE Site. PCBs have been detected in groundwater, soil and in building interiors at the industrial park; at adjacent residential, commercial and municipal properties; and in the surface water and sediments of the Bound Brook (EPA 2003).

## 1.1.1 Site History Overview

In June 1994 at the request of the New Jersey Department of Environmental Protection (NJDEP), EPA collected and analyzed soil, surface water and sediment samples from the facility. The results from these analyses revealed that elevated levels of PCBs, volatile organic compounds and inorganic compounds were present. In February, June and July 1996, EPA collected and analyzed additional soil samples at the facility and confirmed the presence of elevated levels of PCBs (EPA 2003).

As a result of the contamination at the facility, EPA in March 1997 ordered the owner of the facility property, D.S.C of Newark Enterprises, Inc. (DSC), a potentially responsible party (PRP) to perform a removal action to mitigate risks associated with contaminated soil and surface runoff from the facility. The removal action included paving driveways and parking areas in the industrial park, installing a security fence and implementing drainage controls (EPA 2003).

In 1997, EPA conducted a preliminary investigation of the Bound Brook to evaluate the potential impacts of contamination in fish and sediments of the Bound Brook (EPA 1999, EPA 2003). As a result of these investigations, NJDEP issued a fish consumption advisory for the Bound Brook and its tributaries, including New Market Pond and Spring Lake (EPA 2003).

EPA has collected soil and indoor dust samples from residential properties near the industrial park and concluded that exposure to PCBs in dust and soil posed a potential health concern for residents at several of the properties. Removal actions of PCB-contaminated soils and interior dust remediation were initiated by EPA at several residences in 1998, 1999 and 2000. In July 1998, EPA included the CDE Site on the National Priorities List (NPL) (EPA 2003).

To date, six PRPs have been identified for the CDE Site including CDE, DSC, Dana, Dana Corporation, Foundation, Norpak, and Federal Pacific Electric Company (EPA 2003).

To expedite the cleanup of the CDE Site, EPA has divided it into remedial action phases or operable units (OUs) (EPA 2003). Operable Unit 4 (OU4) addresses contamination in the Bound Brook.

#### 1.2 Location of the Bound Brook

The Bound Brook is a moderately sized perennial stream; its headwaters are located in the Dismal Swamp, the largest contiguous wetland in Middlesex County. From the Dismal Swamp, the Bound Brook traverses through South Plainfield to New Market Pond (Figure 1). The Bound Brook traverses the southeast corner of the CDE Site (also known as Hamilton Industrial Park). Stream width varies from 10 to 20 feet across the site, with a varying depth of approximately 1 to 4 feet. The Bound Brook flows northwest for approximately 0.5 miles before joining the Cedar Brook, which drains Spring Lake to the northeast. The Bound Brook flows approximately 0.75 miles before emptying into the east end of New Market Pond. After flowing over a spillway at the west end of New Market Pond, the Bound Brook continues west for approximately four miles before joining with the Green Brook. The Green Brook continues southwest for another three miles before flowing into the Raritan River.

## 1.3 Sampling Design

Details of the sampling methodologies can be found in the REAC Cornell-Dubilier Bound Brook Reassessment Statement of Work and Quality Assurance Quality Control plans (Appendix G). The sampling design, including delineation of sampling locations/reaches and types/species of biota to be sampled, was developed to support an ERA. In addition, data was generated for exploration of potential source identification, utilizing patterns of PCB congener distributions of selected tissue.

The historical biota data (EPA 1999) included species specific data on multiple fish species and crayfish. The PCB determinations in the 1999 EPA study were made as Aroclors. The analysis was conducted on an individual fish basis, as well as with pooled fish, dependent upon the fish mass and analytical mass requirements.

The following is a brief summary of the sampling activities conducted for the ERA, and graphical and statistical evaluations that were used to establish PCB congener profiles for Asiatic clam and fish tissue samples collected by REAC and sediment samples collected by EPA Region II.

## 1.4 Data Quality Objectives (DQOs)

The data quality objectives for this investigation included:

- generate biota data which could be statistically compared to the historical biota data;
- generate biota/tissue data required for exposure estimate inputs to both human health and ecological risk assessments;
- generate biota data which can be interpreted relative to fate and transport issues; and
- generate data which can be compared between locations to determine if the PCBs present are from the same PCB source area.

## 1.5 Field Sampling

The sampling plan design of this effort followed EPA guidance entitled Using Fish Tissue Data to Monitor Remedy Effectiveness (EPA 2007) and Guidance for Assessing Chemical Contaminant Data in Fish Advisories, Volume 1, Fish Sampling and Analysis (EPA 2000).

REAC biota sampling occurred from September 2008 through October 2008 and included both fish and invertebrates (Asiatic clams). Bioaccumulation of PCBs by fish species will vary based on size, lipid content, feeding habits and movement patterns. Carp, white suckers, and sunfish (pumpkinseed and bluegill) were targeted for sampling to address these factors of variability. Both fillet and offal (the reminder of the carcass after filleting) tissues were analyzed. Invertebrates, being more stationary, were sampled to assess localized effects. Sampling locations mirrored the sampling locations utilized in a previous investigation (EPA 1997), with the exception of adjustments to the sampling locations closest to the CDE Site. Fish species collected were targeted based upon the data generated in the pervious investigation (EPA 1997).

Seven sampling locations were included in the 2008 study design, as follows:

- 1. Reference location upstream of the site within the Bound Brook
- 2. The Bound Brook adjacent to the site
- 3. Downstream of the site between the railroad (R.R.) culverts
- 4. Below the confluence of the Bound Brook and the Cedar Brook
- 5. At the Clinton Avenue Crossing
- 6. New Market Pond
- 7. Spring Lake

1.6 Fish Sampling (Carp, White Suckers, Pumpkinseed and Bluegill Sunfish)

Fish collections were performed using electroshocker equipment during the week of September 29, 2008. A boat electroshocker was used at Stations 6 and 7 and a barge electroshocker was used at Stations 1 through 5 for the fish collections.

Only the target fish (*i.e.*, carp, white suckers, pumpkinseed and bluegill sunfish) were retained from the electroshocking. A target of eight individual carp was collected from each sampling location. A target of five individuals of similar size was collected for each of the five composite samples.

Fish collections were brought back to the ERT/REAC Biological Laboratory where they were measured and weighed. For each fish, a scraping of a few scales were removed and retained for possible age determinations. Carp were collected from Stations 6 and 7 and white suckers were collected from all stations. Pumpkinseed sunfish were collected from Stations 1 through 5 and bluegill sunfish were collected from Stations 5, 6 and 7. A total of 16 carp, 37 white suckers, 124 pumpkinseed sunfish and 63 bluegill sunfish were collected. Tables 1 to 7 present the fish collected at each station, including the length and weight of each fish.

The carp were treated as individual specimens. All of the white suckers were treated as individual specimens with the exception of two white sucker samples that were composited for Station 2. All of the pumpkinseed and bluegill sunfish were composited into samples primarily based on size. Each individual fish or composite sample was wrapped in aluminum foil and placed into a ziplock bag and then placed into a freezer set at minus (-) 20 degrees Celsius (°C). All 95 samples, including the individual and composite samples, were packaged in dry ice and shipped to the subcontract laboratory.

The processing of these samples by the subcontract laboratory involved filleting one side of each fish and then homogenizing the fillets followed by homogenizing the remainder of the carcass (*i.e.*, offal) to provide two sets of tissue results for each sample. The total number of samples of fillets and carcasses was 190 tissue samples. Each fillet and carcass sample was weighed. Each homogenized sample (*i.e.*, fillet and carcass) was analyzed for percent (%) solids, % lipids and PCB Aroclors. A total of 49 tissue samples were analyzed for PCB congeners (Tables 1 to 8). Tables 2 to 8 identify the samples, number of fish in each sample, length and weight of each fish and/or composite sample.

A summary of the number of fish samples sent for PCB congener analysis per station and species follows:

Station 1:	White Sucker – 1 sample
	Pumpkinseed – 1 sample
Station 2:	White Sucker – 2 sample
	Pumpkinseed – 1 sample
Station 3:	White Sucker – 1 sample
	Pumpkinseed – 1 sample
Station 4:	White Sucker – 1 sample
	Pumpkinseed – 1 sample
Station 5:	White Sucker – 1 sample
	Pumpkinseed – 1 sample
	Blue Gill – 1 sample
Station 6:	White Sucker – 1 sample
	Blue Gill – 1 sample
	Carp – 1 sample
Station 7:	White Sucker – 1 sample
	Blue Gill – 1 sample
	Carp – 1 sample

#### 1.7 Invertebrate Sampling

Crayfish sampling was attempted by placing five crayfish traps at each of the seven stations during the week of September 22, 2008. Bait was placed into each trap and the traps were checked daily over a three-day period. Only one crayfish was captured from this sampling effort. A few other crayfish were later collected at Station 5 during the electroshocking for the fish sampling. Low trapping success with other collection efforts suggested the field effort required to collect enough crayfish to meet the DQO's of the study, would be high. During the field efforts, it was observed that large populations of Asiatic clams were present. Substitution of Asiatic clams for crayfish was evaluated to determine if the Asiatic clams collection would meet the study DQOs. It was concluded that collection of this alternate invertebrate species would meet the study DQOs, therefore, crayfish sampling was discontinued and Asiatic clams were collected at Stations 1 through 5.

Asiatic clam sampling was performed at Stations 1 through 5 during the week of October 6, 2008. The clams were retrieved from the stream bed by hand using dip nets and transported back to the ERT/REAC Biological Laboratory for a depuration period of 24 hours. Following the depuration period, the clams were sorted to size and frozen at -20 °C. During the week of October 10, 2008, the tissue was removed from each of the bivalve shells and the total amount of tissue for each composite sample was weighed. Fifteen composite samples were packaged in dry ice and shipped to the subcontract laboratory to be homogenized and analyzed for % solids, % lipids and PCB Aroclors. Five (one sample from each station sampled) of the 15 composite samples were analyzed for PCB congeners (Table 11).

## 1.8 Wildlife Survey

A reconnaissance-level wildlife survey was performed that targeted mammal (specifically mink) and bird species that could be potentially utilizing or inhabiting various reaches of the Bound Brook from the Dismal Swamp to downstream of the CDE Site. Observations on animal tracks, evidence of scat and animal runs and type of habitat incorporated this investigation. In addition, an inventory of mammal and bird species was compiled based on literature reviews and habitat present within the Bound Brook (Appendix B).

#### 1.9 Region II Sediment Sampling

REAC obtained the analytical results of PCB congener analyses for twelve sediment samples collected by EPA Region II. The sediment samples were collected from two reaches of the Bound Brook: two samples from Reach 2 and ten samples from Reach 3. Information obtained from the EPA/ERT WAM indicates that Reach 2 encompasses REAC's Station 2 (Bound Brook adjacent to the CDE Site) and Reach 3 encompasses REAC's Station 3 (downstream of the CDE Site between the R.R. culverts).

#### 2.0 PCB CHEMICAL FATE TRANSPORT AND ECOLOGICAL TOXICITY

More complete reviews of PCB chemistry, environmental fate and transport as well as toxicology are presented in Appendix C. A brief discussion is presented here.

#### 2.1 PCB Uses

PCBs are a group of chlorinated aromatic compounds that have been produced synthetically starting in 1929. Most producers throughout the world reduced or stopped production in the 1970's. The physical and chemical properties of PCB mixtures (including thermal stability; resistance to acids, alkalis, oxidation and hydrolysis; low flammability; low solubility in water; low vapor pressure; high electrical resistance and favorable dielectric constant) have made them useful for a variety of commercial applications. Commercial PCB mixtures have been used as fluids in capacitors and transformers, hydraulic acid and heat transfer fluids, lubricants, plasticizers and adhesives (Erickson 1997, Moore and Ramamoorthy 1984).

## 2.2 PCBs Chemistry and Naming

There are 209 different PCB congeners, identified by the number of chlorines attached and their location on the biphenyl molecule. Throughout this document, PCB congeners will be identified using the IUPAC system, which uses a sequentially increasing numeric system from 1 to 209. The individual congener number increases with the degree of chlorination. Table 9 contains the naming devices used for the 209 congeners based on the IUPAC numeric system, REAC acronyms, IUPAC chemical name, and the CASRN number. For example, within this document PCB 1 refers to 2-chlorobiphenyl (CASRN:2051-60-7).

Of the 209 PCB congeners (Tables 9 and 10), 71 typically cannot be resolved individually due to co-elution. On Table 10, sets of co-eluting congeners are identified with a "/" between the numeric identifiers. For example, PCB 12 and PCB 13 which are co-eluting are identified as PCB 12/13. Sets of co-eluting congeners were treated similarly to the congeners which were resolved individually.

Table 9 presents the ten PCB homologs, grouped and named according to the number of chlorines attached to the biphenyl. In this document, they are referred to as monochlor, dichlor, trichlor, tetrachlor, pentachlor, hexachlor, heptachlor, octachlor, nonachlor, and decachlor. Analytical results of the congeners within each homolog group were summed to obtain a representative measurement of total congener concentration per homolog. Analytical results which were below the reporting limit (qualified as 'U') were not included in the sums. Measurements which were qualified as EMPC, estimated maximum possible concentration, were included in the sums.

#### 3.0 RESULTS

## 3.1 Analytical Data

All analytical data, detection limits, QA/QC evaluations, data qualifiers and methods are contained in six Analytical Reports in Appendix A, the reports are as follows:

Asiatic Clams -Total PCB and Aroclor Determinations Fish Fillets - Total PCB and Aroclor Determinations Fish Carcasses - Total PCB and Aroclor Determinations Asiatic Clams -PCB Congener Determinations Fish Fillets -PCB Congener Determinations Fish Carcasses -PCB Congener Determinations

Analyses were performed by PACE Analytical, Inc. Validation of all data was performed by ERT/REAC analytical chemists. The entire data validation package, which encompasses more than 3,000 pages of data, graphs, and calibrations has been archived under the ERT/REAC contract. All samples were maintained following chain-of-custody procedures. All chain-of-custody forms can be found in the Final Analytical Reports Appendix A).

## 3.2 Wildlife Species Investigation

A wildlife species investigation, performed on December 3, 2009, was conducted on several reaches of the Bound Brook providing a reconnaissance-level habitat assessment and wildlife species search (Appendix B). Five reaches were surveyed. Survey Area 1 (Station 1) was located in the Dismal Swamp. Survey Areas 2 and 3 (Stations 2 and 3) were adjacent to the CDE Site. Survey Area 4 (Station 4) was situated downstream of the Bound Brook confluence with Cedar Brook and Survey Area 5 (Station 5) was located approximately one-half mile downstream of Survey Area 4. Overall, wildlife tracking conditions were excellent as a result of a heavy rain that occurred three days before the survey. The soft sediments along the banks and mudflats revealed numerous track impressions of birds and mammals at each of the reaches. At Survey Area 1, mink tracks were found at several places along the banks. The mink detected at Survey Area

1 is probably part of a viable population inhabiting the Dismal Swamp. In addition, tracks of striped skunk, raccoon, white tail deer and wild turkey were also observed at Survey Area 1, along with small mammal burrows and beaver woodcuts. Survey Areas 2 and 3 combined, adjacent to the CDE Site, is characterized as a narrowly wooded corridor along this section of the Bound Brook that does open-up through broader open field / forested riparian habitats downstream at Survey Area 4. At Survey Areas 2 and 3, a high density of tracks were found that included gray squirrel, raccoon, striped skunk, mice and white-tailed deer, along with numerous small bird tracks. In addition, a fisher (*Martes pennanti*) track and scat were observed at this location. Although the fisher is considered rare in New Jersey, it is expected that the fisher probably was a transient individual moving through the area. At Survey Area 4, notable tracks included mice, squirrel, white-tailed deer and muskrat. Muskrats would be attracted to this reach particularly with its open grassy area. Survey Area 5 is connected to the open space at Survey Area 4, but it is bordered by industrial and residential development. At Survey Area 5, exposed tracks were also revealed including the raccoon.

## 3.3 Targeted Fish Species Sampling

Fish collecting for tissue analysis was performed at the seven stations, designated in Figure 1, using fish electroshocker techniques. The fish targeted for the tissue analyses were carp, white suckers and sunfish (two species were collected, pumpkinseed and bluegill sunfish). All non-target fish that were released back to the aquatic system. Other fish species that were commonly found included the American eel, banded killifish, large mouth bass, redfin pickerel, and bullhead catfish. Tables 1 to 8 provide a summary of the target fish collected and analyzed.

Carp were only collected in New Market Pond (Station 6) and Spring Lake (Station 7). White suckers were collected at all seven stations with the majority of them being adult size. Pumpkinseed sunfish were collected at Station 1, 2, 3, 4 and 5 and bluegill sunfish were collected at Station 5 6, and 7. Both pumpkinseed and bluegill sunfish are carnivores feeding primarily on adult and larval insects and small and larval fish. Tables 1 to 8 present the length and weight of each fish collected.

#### 3.4 Fish Tissue: Total PCB and Aroclor Determinations

Tables 1 to 8 list the fish (carp, white suckers and sunfish (bluegill sunfish and pumpkinseeds) that were collected for tissue analyses. Each of the eight individual carp collected at both locations was analyzed separately. Each of the white suckers was analyzed individually with the exception of two composite samples at Station 2. All of the pumpkinseed and bluegill sunfish samples were composite samples that incorporated 4 to 5 individuals for each composite.

Three Aroclors (1248, 1254 and 1260) were identified from the fish tissue analyses (Table 1). Both Aroclors 1248 and 1254 were determined in all tissue samples with Aroclor 1254 being at predominately higher concentrations. Aroclor 1260 was identified in most of the fish tissue samples but at much lower concentrations than Aroclors 1248 and 1254.

Total PCB concentrations were determined by enumerating all detectable Aroclor concentrations for both the fillets and carcasses of each fish and/or composite sample. Whole body concentrations for total PCBs of each fish sample were calculated based on the following formula:

```
Whole Body Concentration = (fillet wt. * fillet conc.) + (carcass wt. * carcass conc.)

(mg/kg w.w.) (fillet wt. + carcass wt.)
```

Table 1 presents the Aroclor concentrations and total PCB concentrations for each fillet and carcass sample plus the whole body concentrations for total PCBs, Aroclor 1248, Aroclor 1254 and Aroclor 1260. Only the Aroclor concentrations that were analytically determined in each sample were utilized for determining the total PCB concentrations. Any Aroclor concentrations that were reported as undetected (U) were not included in the calculations.

## 4.0 CHEMICAL INTERPRETATION OF DATA

## 4.1 Statistical Analyses

Statistical analysis of the data was conducted as an exploratory investigation of PCB congeners present along different reaches of the Bound Brook. Initially, data was graphed to determine if patterns of congener distributions could be identified in the clam and fish tissue (fillet and carcass) samples as well as in Region 2 sediment samples. When patterns of congener distributions did emerge and appeared consistent across the tissue and sediment data, PCA was used to reduce the dimensionality of the data set from the measurements of over 100 congeners to a smaller number of linear components which could account for the variability of the congener distributions along the Bound Brook. The resulting principal components were graphed, again as an exploratory means, to determine if a pattern related to the locality of the collection points (upstream of, adjacent to or downstream from the CDE Site) could be identified. Once an estimate of the number of principal components was identified for each matrix, it was applied to PVA. PVA was undertaken with the understanding that many complex biological and chemical processes could affect the presence of the congener distributions within the Bound Brook. It is a first attempt at "un-mixing" the possible PCB sources that are impacting the Bound Brook. It should be noted that these data assessments are concentration independent.

Throughout this document, leading numbers in sample IDs represent the Station they were collected from, followed by an abbreviation of the organism sampled. For example: 2-WS-3 is a white sucker sample collected from Station 2.

#### 4.1.1 Bar Chart

Congener measurements were graphed as bar charts (Figures 2 through 8). Vertical bar charts were created per matrix (Asiatic Clam tissue, fish fillet and carcass tissue, and sediment). Bars represented stations and congener measurements were represented as percent contribution to Total PCBs as nanograms per kilogram wet weight (ng/Kg w.w.). Similarly, bar charts were created with PCBs represented as homolog groups.

The objective for creating the bar charts was to determine if PCB "fingerprints" differed visually among stations. Locations of the stations were unknown to the individual conducting the analyses. This was a means for obtaining unbiased interpretation of the resulting patterns.

It was expected that Station 1 (upstream of the CDE Site) would show a distribution of PCB congeners unique to the remaining stations. This was identifiable in the bar charts of the clam and fish tissue samples (no sediment samples were analyzed for PCB congeners in this reach). The distribution of congeners, in fish tissue samples collected at Station 7 (Spring Lake), was also unique from all of the other stations.

Given the known physical and chemical properties of PCB weathering, there was also an expectation that samples collected downstream of the CDE Site would present similar yet slightly different patterns of congener distributions. Stations 4 and 5 downstream of the confluence of the Cedar Brook with the Bound Brook displayed similar patterns of congener contributions for both the clam and fish tissue samples (no sediment samples were collected within this reach). Only fish tissue samples were collected at Station 6 (New Market Pond). Bar charts showed fish samples collected at Station 6 had a similar pattern of PCB congeners to Stations 4 and 5.

Bar charts for Stations 2 and 3 (clam tissue, fish tissue, sediment) presented an unexpected distribution of congeners. Both Station 2 and Station 3 are adjacent to the Site, with Station 3 downstream from Station 2. Bar chart patterns presented a distinct difference in PCB congener distribution between these stations. The implication is that another environmental, chemical or physical factor is influencing the proportional distribution of PCB congeners in the reach between Station 2 and Station 3.

The identification of spatial patterns within the bar charts justified pursuing more complex exploratory multivariate analyses.

## 4.1.2 Principal Component Analysis

PCA is a multivariate statistical technique, often used as an exploratory tool, for reducing a data set with a large number of variables to a smaller set of linear combinations of the original variables. These sets of linear combinations are referred to as principal components (PCs) or factors. PCA reduces the dimensionality of a data set by creating linear combinations of the original variables which account for the variability within the original data set. The first PC accounts for the greatest variability, the second PC, the second greatest variability, etc. In theory, there can be an infinite number of PCs made up of varying linear combinations of the original variables. It is up to the individual performing the analysis to specify a desired number of principal components or a condition at which the analysis will cease running. The allowance of both positive and negative loadings can be a limitation to PCA. Loadings are linear factors which make up the principal components. For this study, this implies that a PCB congener, in theory, could have a negative contribution. PC loadings are abstract, orthogonal (non-overlapping/mutually exclusive) matrices which do not represent actual chemical or source contributions.

For this study, PCA was used as an exploratory tool to reduce the PCB congener measurements from a set of over 100 variables (individual and co-eluting congeners) to a smaller set of PCs explaining a large percentage of variability. It was also used as an intermediary step to PVA. The goal was to determine the appropriate number of PCs which could adequately explain the variability within the congener datasets. When plotted these PCs could assist in determining a spatial trend within the PCB measurements. It is known that there are multiple sources of environmental contamination feeding into the Bound Brook, including sources upstream of the CDE Site. PCA was used as an exploratory environmental forensic tool to identify spatial trends and the number of possible sources of PCB contamination along the reaches of Bound Brook which were sampled. The number of potential sources or "mixes" identified through PCA was then applied to PVA.

PCA was run using SAS® version 9.0's "Proc Princomp". Statistical output and graphs associated with PCA can be found in Appendix A. Measurements qualified with a "U", indicating that the analytical result was below the reporting limit, were included in the analyses as the value of the corresponding reporting limit. Congener measurements were standardized as a percent of Total PCBs (ng/Kg w.w.) prior to running the PCAs.

#### 4.1.2.1 Asiatic Clams – PCA

PCA results for Asiatic clam tissue data indicated that the congener data could be reduced to a three dimensional model which explained 99% of the variability. Below are the eigenvalues which were computed:

Eigenvalues of the Covariance Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	0.00135933	0.00121036	0.8397	0.8397
2	0.00014897	0.00005005	0.0920	0.9318
3	0.00009893	0.00008738	0.0611	0.9929
4	0.00001155	0.00001155	0.0071	1.0000
5	0.00000000		0.0000	1.0000

The addition of PCs four and five did little to improve the model. The chemical interpretation of the three principal components needs to be determined in order to understand what these three components

represent and how they relate to the PCB mixtures in the Bound Brook. Principal component loadings are listed in the table below.

Asiatic Clams: Table of Principal Component Loadings					
PCB Congener	Prin 1	Prin 2	Prin 3		
PCB_1	-0.004697	-0.007555	0.000459		
PCB_2	0.000000	-0.000043	-0.00013		
PCB_3	-0.000371	-0.001357	-0.000392		
PCB_4	-0.194531	-0.381762	-0.07549		
PCB_10	-0.008401	-0.015449	-0.001233		
PCB_9	-0.000047	-0.001345	0.003545		
PCB_7	-0.000348	-0.001537	0.001124		
PCB_6	-0.002887	-0.010606	0.021639		
PCB_5	0.000031	-0.000481	0.001432		
PCB_8	-0.003315	-0.03144	0.053632		
PCB_12_13	-0.009325	-0.0181	-0.004821		
PCB_15	-0.008209	-0.027386	0.020787		
PCB_19	-0.091097	-0.151653	-0.019117		
PCB_18_30	0.006473	0.034433	0.138153		
PCB_17	-0.062295	-0.071307	0.025101		
PCB_27	-0.226244	-0.01876	-0.015799		
PCB_24	0.000549	0.000168	-0.001443		
PCB_16	0.00745	-0.004786	0.043378		
PCB_32	-0.026674	-0.007666	0.042026		
PCB_34	-0.000744	-0.000386	0.001145		
PCB_23	0.000031	0.000029	0.000089		
PCB_26_29	-0.013872	0.118489	0.07004		
PCB_25	-0.017632	0.031857	0.025623		
PCB_31	0.00617	0.020268	0.08126		
PCB_20_28	0.005413	-0.009867	0.115837		
PCB_21_33	0.006437	0.00219	0.01674		
PCB_22	0.010325	0.007543	0.019611		
PCB_39	0.00011	-0.000162	-0.000428		
PCB_38	-0.000168	0.001669	0.001449		
PCB_35	0.000428	0.000313	-0.00026		
PCB_37	0.003097	-0.001359	0.017056		
PCB_54	-0.007795	-0.000566	0.003585		
PCB_50_53	-0.160795	0.248132	0.017584		
PCB_45_51	-0.054831	-0.010878	-0.030091		
PCB 46	-0.010098	0.030252	0.012384		

PCB_52	-0.207268	0.336174	0.137325
PCB_73	0.001665	-0.012282	0.015655
PCB_43	-0.001183	-0.000029	-0.003407
PCB_49_69	-0.203574	0.475812	0.379495
PCB_48	0.007958	-0.008068	-0.017164
PCB_44_47_65	-0.203094	0.003073	-0.098998
PCB_59_62_75	-0.008241	0.141896	0.063553
PCB_42	-0.018628	0.053135	-0.085107
PCB_40_41_71	-0.026673	0.002591	-0.037116
PCB_64	0.009281	0.04878	0.05343
PCB_72	-0.009403	0.040986	0.025077
PCB_68	-0.010508	0.015543	0.014226
PCB_57	-0.002175	0.022189	0.013271
PCB_58	-0.000415	0.00426	0.001055
PCB_67	-0.000294	0.016233	0.009714
PCB_63	-0.002399	0.003833	0.006739
PCB_61_70_74_76	-0.042901	-0.110811	0.068281
PCB_66	-0.052875	-0.033821	0.077649
PCB_56	0.01793	0.001914	-0.022111
PCB_60	0.007081	-0.006108	-0.001281
PCB_79	-0.001177	-0.003731	-0.008346
PCB_81	0.000329	-0.000239	-0.000599
PCB_77	0.006464	0.004066	-0.004923
PCB_104	-0.000593	-0.000124	0.000326
PCB_96	-0.001254	0.004862	-0.000193
PCB_103	-0.004196	0.013093	0.007143
PCB_94	-0.006025	-0.001824	0.001018
PCB_95	-0.02604	0.288385	-0.623327
PCB_93_98_100_102	-0.014041	-0.007766	-0.017385
PCB_88_91	-0.008164	0.061765	-0.01563
PCB_84	-0.005733	0.011402	-0.063164
PCB_89	0.003114	-0.000347	-0.00906
PCB_121	-0.000299	0.000723	0.000659
PCB_92	-0.021582	0.105268	0.019835
PCB_90_101_113	-0.144161	-0.14479	-0.044041
PCB_83	0.004298	0.01889	0.009145
PCB_99	-0.140872	0.047753	0.071336
PCB 86 87 97 108 119 125	-0.095555	-0.172812	-0.152891
PCB_85_117_116	-0.013525	-0.039505	0.001828
PCB_110_115	-0.073546	0.090221	-0.263762
PCB_82	0.002297	-0.034496	-0.02671

PCB_111	-0.00062	0.003303	0.00169
PCB_120	-0.001172	0.009891	0.005462
PCB_107_124	-0.00286	-0.007106	-0.006642
PCB_109	-0.014747	0.00659	0.022583
PCB_123	0.001414	0.001779	-0.006614
PCB_118	-0.248585	-0.244698	-0.024616
PCB_122	0.000449	-0.002689	-0.003654
PCB 114	-0.002484	-0.011113	0.003079
PCB_105	-0.047876	-0.160823	0.031552
PCB_127	0.000108	-0.000173	-0.000572
PCB 155	-0.000019	0.000032	-0.000106
PCB 152	-0.000116	-0.000372	0.000094
PCB 150	-0.000016	0.000373	0.000364
PCB 136	0.02811	0.001859	0.019014
PCB 145	0.000016	-0.000081	0.000081
PCB 148	0.000066	0.000173	-0.000107
PCB 135 151	0.171823	0.016031	-0.072085
PCB 154	0.000524	0.004779	0.00422
PCB 144	0.020306	-0.013663	-0.004449
PCB 147 149	0.277048	0.032497	-0.080415
PCB 134 143	0.009425	-0.001523	0.013709
PCB 139 140	0.001644	-0.001389	0.00905
PCB_131	0.004165	-0.00685	-0.002276
PCB_142	0.00005	-0.000113	0.000107
PCB_132	0.06652	-0.055839	0.007812
PCB_133	0.003662	0.007146	0.00306
PCB_165	-0.000114	0.001854	0.000722
PCB_146	0.060494	0.007584	0.001382
PCB_153_168	0.56256	0.199298	-0.03501
PCB_141	0.011445	-0.018474	-0.015764
PCB_130	0.015342	-0.014801	0.012555
PCB_137	0.000776	-0.008484	-0.008894
PCB_164	0.015432	-0.013686	-0.002013
PCB_129_138_163	0.296575	-0.227582	0.400728
PCB_158	0.025862	-0.049807	0.06717
PCB_128_166	0.030057	-0.047831	0.128874
PCB_159	0.00005	-0.000114	0.000108
PCB_162	0.001182	0.001195	-0.003165
PCB_167	0.009123	0.029228	-0.024122
PCB_156_57	-0.001862	-0.001603	0.002802
PCB_169	0.000253	-0.001671	0.001179

PCB_188	0.000155	0.000068	-0.000422
PCB_179	0.060164	-0.010554	-0.045547
PCB_184	-0.000012	0.000007	0.000089
PCB_176	0.019218	-0.006871	-0.005322
PCB_178	0.034866	-0.005575	-0.027879
PCB_175	0.006981	-0.002322	-0.004156
PCB_187	0.219464	-0.071746	-0.10369
PCB_182	0.000226	-0.000127	-0.000144
PCB_183_185	0.096231	-0.046475	0.006632
PCB_174	0.033445	-0.004319	-0.042888
PCB_177	0.07818	-0.046754	0.015139
PCB_181	0.000483	-0.000183	0.000789
PCB_171_173	0.039545	-0.033606	0.040889
PCB_172	0.003218	0.000208	-0.00522
PCB_180_193	0.135285	0.005211	-0.154628
PCB_191	0.003336	-0.002199	0.001821
PCB_170	0.022089	-0.005455	-0.00962
PCB_190	0.014985	0.008666	-0.009955
PCB_189	0.000623	-0.000012	-0.000403
PCB_202	0.013027	0.001337	-0.02275
PCB_201	0.009527	-0.000602	-0.011709
PCB_197_200	0.005456	-0.000035	-0.006854
PCB_198_199	0.015374	0.003018	-0.030827
PCB_196	0.008199	0.000239	-0.010324
PCB_203	0.030481	-0.001414	-0.029764
PCB_195	0.011033	-0.003623	-0.002139
PCB_194	0.002689	0.000783	-0.005065
PCB_205	0.001554	-0.000705	0.000152
PCB_208	0.001759	0.000499	-0.004431
PCB_207	0.000838	0.000147	-0.001737
PCB_206	0.003859	0.000852	-0.008002
PCB_209	0.001737	0.000492	-0.004942

Graphs of the first three PCs represented in three-dimensional and two-dimensional space are included in Appendix A. Three-dimensional graphs were rotated in 90 degree increments to better visualize the distribution of the Stations based on the application of the three principal components, Prin 1, Prin 2 and Prin 3. As in the bar charts, Stations 4 and 5 are located near to each other, varying minimally along the axis for Prin 1. Station 1 has a different fingerprint than all other Stations. Stations 2 and 3 are different from each other, with Station 2 having similar characteristics to Station 1 for the parameters represented in Prin 3, but differing in Prin 1 and Prin 2. Based on these results three principal components were used in the PVA for the Asiatic Clam tissue.

## 4.1.2.2 Carp: Fish Tissue - PCA

Carp were only collected at two locations so the tissue results were not evaluated using PCA.

## 4.1.2.3 White Sucker: Fish Tissue – PCA

PCA results for White Sucker fillet tissue data indicated that the congener measurements could be reduced. Three principal components explain 94% of the variability, four explain 96%, and if five is included 98% of the variability can be explained. Eigenvalues and cumulative variability for each additional PC is listed below:

White Sucker Fillet
Eigenvalues of the Covariance Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	0.00138181	0.00080938	0.6434	0.6434
2	0.00057244	0.00049865	0.2665	0.9099
3	0.00007379	0.00002988	0.0344	0.9443
4	0.00004391	0.00000646	0.0204	0.9647
5	0.00003745		0.0174	0.9822

It is up to the data analyst to determine what amount of variability adequately explains the model when evaluating a PCA. Most lean towards a three-dimensional or three-component model simply because it is easier to visualize. All five PC loadings are tabulated. Three-component plots can be found in Appendix F.

In this instance, PCA was not the end-result of the data analysis, just a step towards PVA so an absolute decision of the number of PCs to use did not need to be made. Tabulated PC loadings are below:

White Sucker Fillet: Principal Component Loadings					
PCB Congener	Prin1	Prin2	Prin 3	Prin 4	Prin 5
PCB_1	0.000253	0.000412	-0.000356	0.005303	-0.001855
PCB_2	0.000039	-0.000266	0.000058	-0.000269	0.000082
PCB_3	0.000051	-0.000241	0.000047	-0.000108	0.00001
PCB_4	-0.010076	0.011065	-0.044337	0.080998	-0.028751
PCB_5	0.000069	-0.000218	-0.000019	0.000091	-0.000088
PCB_6	-0.001244	0.000766	-0.007884	0.012123	-0.002634
PCB_7	-0.000096	0.000101	-0.000959	0.001529	-0.00056
PCB_8	0.001455	0.004103	-0.015687	0.031037	-0.015195
PCB_9	-0.00021	0.000236	-0.002109	0.002785	-0.000443
PCB_10	-0.001322	0.00119	-0.005001	0.00849	-0.003018
PCB_11	-0.000275	-0.006309	-0.00171	-0.005315	0.003898
PCB_14	-0.000436	-0.000146	0.002258	0.000286	0.000563
PCB_15	-0.000071	-0.000385	-0.001455	0.002705	-0.002434
PCB_16	-0.005938	-0.002949	-0.019543	0.020745	-0.009516
PCB_17	-0.055974	0.029559	-0.118839	0.074088	0.023617
PCB_19	-0.023999	0.018315	-0.084815	0.064629	0.012251
PCB_22	-0.006391	-0.00716	-0.024133	0.035788	-0.007885
PCB_23	-0.000045	-0.00025	-0.000192	-0.000058	-0.000054
PCB_24	0.000039	-0.000267	0.000061	-0.000285	0.00009
PCB_25	-0.0118	0.002243	-0.016331	0.01653	-0.002599

1 505.05		0.040006			
PCB_27	-0.083442	0.043336	-0.110685	0.028259	0.017869
PCB_31	-0.018908	-0.011337	-0.06702	0.059188	-0.009914
PCB_32	-0.04235	0.008182	-0.096297	0.072496	0.017291
PCB_34	-0.000782	0.000334	-0.00138	0.001175	0.00075
PCB_35	0.000048	-0.000239	-0.000034	-0.000254	0.000494
PCB_37	-0.00054	-0.002435	-0.002344	0.00774	-0.004883
PCB_38	-0.00024	-0.000094	0.00047	-0.00044	0.000578
PCB_39	-0.000013	-0.000179	-0.00015	0.000307	0.000095
PCB_42	-0.059729	-0.006633	-0.010795	0.04667	-0.014029
PCB_43	-0.00496	-0.000822	0.020226	0.015301	0.023584
PCB_46	-0.026315	-0.00056	-0.026601	-0.015885	-0.004743
PCB_48	-0.005024	-0.008812	-0.013635	0.004988	-0.008317
PCB_52	-0.233125	0.032353	-0.276187	-0.347775	-0.470399
PCB_54	-0.00435	0.002749	-0.00886	-0.000913	0.001849
PCB_55	0.000039	-0.000267	0.000061	-0.000285	0.00009
PCB_56	-0.001339	-0.01291	-0.016843	0.020967	0.012808
PCB_57	-0.003582	0.002213	0.008264	0.004373	0.002217
PCB_58	-0.002591	0.000384	0.000107	0.001862	0.001661
PCB_60	0.0004	-0.012316	-0.008662	0.017719	0.000304
PCB_63	-0.004709	0.001876	0.001834	0.016756	0.005249
PCB_64	-0.064065	-0.030384	-0.043621	0.08714	-0.025682
PCB_66	-0.061841	0.017895	0.046506	0.286917	0.127486
PCB_67	-0.002529	-0.000036	-0.001585	0.003732	0.002188
PCB_68	-0.013799	0.009226	0.016802	0.017277	0.015722
PCB_72	-0.021888	0.007296	0.015085	0.013685	0.013179
PCB_77	-0.001188	-0.006134	-0.000708	0.001904	-0.000175
PCB_78	0.000189	-0.003365	-0.005988	0.003819	-0.006678
PCB_79	0.00219	-0.005773	0.003458	0.014737	0.001063
PCB_81	0.000314	-0.001799	0.000864	-0.001487	0.001807
PCB_82	0.028043	0.022378	-0.015349	-0.005477	-0.01653
PCB_83	-0.019569	0.011159	-0.001747	0.016729	-0.007607
PCB_84	-0.031725	0.016985	-0.02776	-0.100064	-0.03096
PCB_89	0.000664	-0.003094	0.000211	-0.002799	0.000385
PCB_92	-0.057002	0.020609	0.023877	0.116604	-0.06455
PCB_94	-0.005532	0.004361	-0.001882	0.004944	0.003969
PCB_95	-0.154064	-0.063399	0.102125	-0.564836	0.125567
PCB_96	-0.006581	0.000822	-0.000388	-0.004189	-0.001482
PCB_99	0.003718	0.171757	0.551021	0.092819	-0.238492
PCB_103	-0.009772	0.002883	0.005263	0.008178	0.004959
PCB_104	-0.00027	0.000102	0.000087	-0.000245	0.000484
PCB_105	0.140563	0.164001	-0.104669	0.023	-0.017248

PCB 109	0.008449	0.027764	0.065897	0.065934	0.014374
PCB 111	-0.000874	0.000395	0.002918	0.001645	0.000621
PCB 114	0.011654	0.013483	-0.010232	0.011421	-0.009811
PCB 118	0.328791	0.571463	-0.205132	-0.241598	0.339206
PCB 120	-0.00329	0.000444	0.008594	0.00653	0.001951
PCB 121	-0.000407	0.000111	0.001044	0.000516	0.000259
PCB 122	0.003058	0.002571	-0.00258	-0.00462	0.001611
PCB 123	0.010885	0.013445	-0.037592	0.053423	-0.011727
PCB 126	0.002873	-0.003116	0.005351	-0.014015	-0.003131
PCB 127	0.000994	0.001005	-0.000569	0.000323	0.00129
PCB 130	0.023316	0.013981	-0.02017	0.000551	-0.005836
PCB 131	0.007304	0.003603	-0.003533	0.003728	0.002907
PCB 132	0.036205	-0.095328	0.012156	-0.059659	0.334186
PCB 133	0.000084	-0.001755	0.0078	0.00866	0.006981
PCB 136	-0.010976	-0.012128	0.020521	0.029291	0.029457
PCB 137	0.030891	0.023456	-0.013043	0.060235	-0.023937
PCB 141	0.060243	-0.024958	-0.032493	-0.016781	0.028267
PCB 142	0.000039	-0.000267	0.000061	-0.000285	0.00009
PCB 144	0.019595	-0.01507	0.027179	0.039687	0.024059
PCB 145	0.000062	0.000007	0.000163	0.000149	0.000204
PCB 146	0.034141	-0.048206	0.024997	0.073876	0.060889
PCB_148	-0.000174	-0.000017	0.00097	0.00137	0.000519
PCB_150	-0.000241	0.00013	0.001143	0.001179	0.000531
PCB_152	-0.000191	0.000182	0.000464	0.000326	0.000717
PCB_154	-0.000224	0.000168	0.004135	0.009648	0.002185
PCB_155	0.000028	-0.000235	0.000114	-0.000218	0.000112
PCB_158	0.051806	0.022668	-0.016196	0.033015	0.013694
PCB_159	0.001064	-0.005299	-0.000777	-0.000185	-0.001098
PCB_161	0.000039	-0.000267	0.000061	-0.000285	0.00009
PCB_162	0.002601	-0.004004	-0.004317	-0.004081	-0.007589
PCB_164	0.031484	-0.008538	-0.01153	-0.01365	0.020115
PCB_165	-0.00029	0.000042	0.001617	-0.000569	0.000459
PCB_167	0.026349	0.01329	-0.003881	-0.003437	-0.023871
PCB_169	0.000013	-0.000306	0.000042	-0.00015	0.000276
PCB_170	0.053692	-0.054245	0.003367	-0.049696	0.002918
PCB_172	0.011475	-0.02181	0.011814	-0.004355	0.012624
PCB_174	0.020899	-0.115012	-0.013476	-0.096607	0.030904
PCB_175	0.001453	-0.005904	-0.000012	-0.002889	0.00249
PCB_176	0.002592	-0.017417	0.000653	-0.006464	0.008459
PCB_177	0.016016	-0.081924	-0.00431	-0.061119	0.019463
PCB_178	0.004193	-0.042917	0.00739	-0.028211	0.015854

DCD 170	0.004041	0.050566	0.00442	0.022750	0.020122
PCB_179	0.004041	-0.059566	0.00443	-0.033759	0.028132
PCB_181	0.001251	0.000206	-0.000003	-0.000202	-0.000855
PCB_182	0.000447	0.000102	-0.000239	-0.001764	-0.000116
PCB_184	0.000045	-0.000175	0.000057	-0.000167	0.000012
PCB_186	0.000043	-0.000223	0.000031	-0.000254	0.000088
PCB_187	0.059868	-0.452601	0.065909	-0.17461	0.073243
PCB_188	0.000049	-0.000242	0.000079	-0.000239	0.000068
PCB_189	0.002149	-0.001123	-0.000252	0.000912	-0.000961
PCB_190	0.00677	-0.01134	0.005687	-0.005947	-0.004414
PCB_191	0.002944	-0.003511	0.002814	0.000519	0.004055
PCB_192	-0.029859	0.003485	-0.108492	-0.098595	-0.107691
PCB_194	0.005899	-0.018513	-0.000572	-0.008547	0.008465
PCB_195	0.00304	-0.013646	0.000734	-0.005293	0.005946
PCB_196	0.004384	-0.020288	0.003958	-0.008907	0.007292
PCB_201	0.001141	-0.010323	0.000985	-0.007511	0.003836
PCB 202	0.001833	-0.014148	0.00192	-0.012805	0.003883
PCB 203	0.007938	-0.039916	0.007133	-0.018895	0.00858
PCB 204	0.000038	-0.000262	0.00004	-0.000267	0.000081
PCB 205	0.000358	-0.002136	0.000037	-0.000831	0.000585
PCB 206	0.002584	-0.017556	-0.000431	-0.019141	0.000818
PCB 207	0.000324	-0.002115	0.000008	-0.002347	0.000283
PCB 208	0.000828	-0.006969	-0.000169	-0.008323	0.000365
PCB 209	0.000978	-0.011073	-0.000776	-0.013876	0.000504
PCB 12 13	-0.000444	-0.000111	-0.000821	0.000084	0.00048
PCB 107 124	0.016521	0.013839	-0.012458	-0.003764	-0.004801
PCB 110 115	0.008636	0.142098	0.505648	-0.188485	0.213514
PCB 128 166	0.089284	0.040684	-0.026215	-0.070366	0.043616
PCB 129 138 163	0.459794	0.004099	-0.070598	0.080099	-0.217628
PCB_134_143	-0.000519	0.000962	-0.014642	-0.008101	0.013997
PCB 135 151	-0.008662	-0.142831	0.032913	0.134707	0.025443
PCB 139 140	0.008478	0.006312	-0.001412	0.027397	0.004284
PCB 147 149	0.131433	-0.256263	0.042694	-0.17239	-0.216239
PCB 153 168	0.277049	-0.141151	0.05033	0.212315	-0.104218
PCB 156 157	0.080895	0.077119	-0.042097	0.071856	-0.072868
PCB 171 173	0.013326	-0.028892	-0.005398	-0.018472	0.014862
PCB 18 30	-0.032204	-0.004252	-0.072406	0.03091	-0.056584
PCB 180 193	0.108108	-0.237245	0.158054	-0.045391	0.157505
PCB 183 185	0.021494	-0.11291	-0.004847	-0.050516	0.063341
PCB 197 200	0.001121	-0.009918	0.001623	-0.006326	0.003541
PCB 198 199	0.009183	-0.047189	0.001023	-0.029402	0.003303
PCB 20 28	-0.050097	-0.047189	-0.122119	0.182414	0.008871

PCB_21_33	-0.00362	-0.005088	-0.016479	0.015532	-0.003329
PCB_26_29	-0.056176	0.004334	-0.071772	-0.000926	-0.00256
PCB_40_41_71	-0.110483	-0.006231	0.021588	0.010794	0.042531
PCB_44_47_65	-0.324758	0.133715	0.030479	0.11012	0.099787
PCB_45_51	-0.086211	0.015852	-0.075072	-0.015005	0.030875
PCB_49_69	-0.482648	0.148843	0.098382	0.106513	0.009468
PCB_50_53	-0.152887	0.030385	-0.093864	-0.07142	-0.015819
PCB_59_62_75	-0.05071	-0.001137	0.001841	-0.010228	-0.000936
PCB_61_70_74_76	0.020917	0.057316	-0.222333	-0.004366	0.13213
PCB_85_117_116	0.039694	0.031302	0.097304	0.121306	0.032686
PCB_86_87_97_108_119_125	0.085951	0.233393	0.212952	-0.111321	-0.116748
PCB_88_91	-0.046779	-0.004784	0.025085	0.114803	0.00791
PCB_90_101_113	0.07469	0.214098	0.143912	-0.071377	-0.433119
PCB_93_98_100_102	-0.01569	0.009813	0.006246	0.027721	0.0083

Plots of the Prin 1 through Prin 3 show the two samples collected at Station 2 are represented similarly along the Prin 2 axis, but differ along Prin 1 and Prin 3. Samples collected from Station 2 and Station 3 differ the greatest along the Prin 2 and Prin 3 axes. Patterns are not as distinct as the Asiatic clam data, but other factors of variability are introduced due to the mobility of the fish.

PCA results for congeners in white sucker carcass tissue, similarly to the white sucker fillet PCA, indicated that a three- to five-component model could be used. A three-component model explains 92% of the variability of the congener distributions at the varying Stations, a four-component model 96% and a five-component model 98%.

White Sucker Carcass
Eigenvalues of the Covariance Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	0.00137016	0.00097427	0.6528	0.6528
2	0.00039589	0.00022976	0.1886	0.8414
3	0.00016613	0.00008093	0.0792	0.9206
4	0.00008520	0.00003450	0.0406	0.9612
5	0.00005070		0.0242	0.9853

Tabulated PC loadings can be found below and three-dimensional graphs in Appendix F. Plots show the two white sucker samples in the same vicinity of each other, differing in space along the Prin 3 axis. The sample collected upstream as a reference is located at a distance from the other samples. Samples from Station 2 and Station 3 differ spatially implying different "mixtures" of congeners are present. Station 3 has the greatest loadings of all the samples along the Prin 3 axis.

White Sucker Carcass: Table of Principal Component Loadings						
PCB Congener	Prin 1	Prin 2	Prin 3	Prin 4	Prin 5	
PCB_1	0.000309	-0.00091	0.003863	-0.00114	0.000469	
PCB 2	0.000032	0.00014	-0.000074	-0.000052	-0.000032	
PCB 3	0.000054	0.00011	0.000065	-0.000062	0.000014	
PCB 4	-0.013316	-0.0109	0.071177	-0.018368	0.022516	
PCB 5	0.000043	0.000042	0.000393	-0.000196	0.000026	
PCB 6	-0.001237	-0.000714	0.010899	-0.003096	0.001711	
PCB_7	-0.000105	-0.000142	0.001552	-0.000474	0.000273	
PCB 8	0.001891	-0.009884	0.034055	-0.024073	-0.00453	
PCB 9	-0.000205	-0.000369	0.002687	-0.000944	0.000231	
PCB_10	-0.001386	-0.000715	0.006307	-0.000448	0.002844	
PCB 11	0.00054	0.000468	-0.000751	-0.002602	-0.001226	
PCB 14	0.000031	0.000138	-0.000085	-0.000052	-0.000042	
PCB 15	0.000138	0.000108	0.00298	-0.000203	0.001996	
PCB 16	-0.007116	0.004626	0.021842	-0.010071	0.008956	
PCB 17	-0.061425	-0.020525	0.09694	-0.024693	-0.004336	
PCB 19	-0.028825	-0.012844	0.067523	-0.020987	0.010797	
PCB 22	-0.006207	0.010593	0.023325	-0.001499	0.019384	
PCB 23	-0.000021	0.000122	0.000026	-0.00005	0.000007	
PCB 24	0.000131	0.000543	-0.000318	-0.000219	-0.000164	
PCB 25	-0.016646	0.002602	0.017117	-0.011837	0.015178	
PCB 27	-0.086078	-0.018033	0.068586	-0.01795	0.031545	
PCB 31	-0.021557	0.021637	0.045793	-0.029899	0.059775	
PCB 32	-0.043471	0.006516	0.070775	-0.013315	0.018849	
PCB 34	-0.000918	-0.000105	0.001182	-0.000157	-0.000103	
PCB 35	0.000031	0.000138	-0.000085	-0.000052	-0.000042	
PCB_36	-0.002062	-0.003208	-0.002177	0.030553	-0.042984	
PCB_37	-0.000749	0.0025	0.005922	0.000161	0.004506	
PCB_38	-0.000433	0.000232	0.000031	0.000494	0.000148	
PCB_39	-0.00007	0.000266	0.000247	-0.000052	0.000179	
PCB_42	-0.050549	0.025737	0.047517	0.004556	0.00399	
PCB_43	-0.008596	0.000382	0.004856	0.014854	-0.028912	
PCB_46	-0.025204	0.009491	0.008955	-0.007524	0.017872	
PCB_48	-0.003585	0.009959	0.006766	-0.007138	0.007224	
PCB_52	-0.244809	0.006087	0.064519	-0.124347	0.623071	
PCB_54	-0.005853	-0.001622	0.00545	-0.002782	0.002667	
PCB_55	0.000031	0.000138	-0.000085	-0.000052	-0.000042	
PCB_56	0.00218	0.01264	0.002802	-0.029056	0.013013	
PCB 57	-0.004136	0.000216	0.001833	0.008375	0.001936	

PCB_58	-0.002376	0.000495	-0.000243	0.002407	-0.002422
PCB_60	0.004158	0.011004	0.005649	-0.0102	0.005175
PCB_63	-0.003703	-0.001596	0.007355	0.002065	-0.005703
PCB_64	-0.048409	0.048454	0.056398	0.017338	0.048669
PCB_66	-0.034434	-0.041712	0.048614	-0.056983	-0.111458
PCB_67	-0.002513	0.001081	0.001948	-0.001186	0.00105
PCB_68	-0.012883	-0.007704	0.007197	0.016038	-0.021068
PCB_72	-0.020526	-0.001413	0.006467	0.027258	-0.015782
PCB_73	0.001496	-0.001659	0.001365	-0.014122	-0.009207
PCB_77	-0.000386	0.007176	0.001692	-0.001919	0.000793
PCB_78	-0.000026	0.000121	-0.000122	0.000547	-0.000481
PCB_79	0.001368	-0.002957	-0.000962	-0.003993	-0.001025
PCB_80	0.000031	0.000138	-0.000085	-0.000052	-0.000042
PCB_81	0.000032	0.000585	-0.000464	-0.000057	-0.000598
PCB_82	0.008161	-0.019427	0.015291	-0.032702	0.009967
PCB_83	-0.019538	0.004894	-0.000032	-0.02196	0.002228
PCB_84	-0.053921	0.007041	-0.005379	-0.124645	0.056782
PCB_89	0.00086	0.004309	-0.001868	-0.004219	-0.001143
PCB_92	-0.066127	0.017956	0.065945	0.034732	-0.007725
PCB_94	-0.006066	-0.001689	0.006017	-0.003943	-0.005405
PCB_95	-0.186596	0.133809	-0.228834	-0.262424	-0.042059
PCB_96	-0.00597	0.001943	0.000909	0.000929	0.000472
PCB_99	-0.033957	-0.173811	-0.150295	0.467622	0.081616
PCB_103	-0.009854	0.001096	0.005475	0.007622	-0.00915
PCB_104	-0.000362	-0.00018	0.000141	0.000026	-0.000691
PCB_105	0.079449	-0.234719	0.048898	-0.182718	-0.022395
PCB_106	0.000031	0.000138	-0.000085	-0.000052	-0.000042
PCB_109	-0.002896	-0.037509	0.02162	0.018742	-0.051619
PCB_111	-0.001181	0.000094	0.000681	0.004278	-0.00184
PCB_112	0.000031	0.000138	-0.000085	-0.000052	-0.000042
PCB_114	0.009534	-0.024341	0.01569	-0.016347	0.004814
PCB_118	-0.012937	-0.308562	-0.258262	0.358425	-0.207363
PCB_120	-0.003693	0.000927	0.001781	0.013393	-0.006934
PCB_121	-0.000454	-0.000013	0.000122	0.001053	-0.000814
PCB_122	0.001879	-0.003237	0.000097	-0.006161	-0.002385
PCB_123	0.00576	-0.009423	0.02666	0.006987	-0.003388
PCB_126	0.000818	0.00136	0.003699	-0.000896	-0.000246
PCB_127	0.000445	-0.000188	0.000142	0.000785	-0.000942
PCB_130	0.019807	-0.024281	0.032613	-0.000487	-0.006652
PCB_131	0.005725	-0.00698	0.002952	-0.001957	0.000806

PCB_132	0.04274	-0.038794	-0.310777	-0.18429	-0.176558
PCB 133	0.001187	0.001928	0.005248	0.013834	-0.016504
PCB_136	-0.003059	0.015883	-0.00415	-0.013958	-0.014094
PCB_137	0.032153	-0.047156	0.043643	0.018924	-0.029192
PCB_141	0.067045	0.023043	-0.041657	-0.008066	0.008895
PCB_142	0.000045	0.000195	-0.000118	-0.000075	-0.000059
PCB_144	0.013518	0.01241	0.011013	0.006363	0.002414
PCB_145	0.000055	-0.000063	0.000113	-0.000129	-0.00008
PCB_146	0.050435	0.033361	0.041448	0.084728	-0.095434
PCB_148	-0.000141	0.000092	0.000585	0.00082	-0.001189
PCB_150	-0.000172	-0.000094	0.000329	0.00029	-0.001126
PCB_152	-0.000156	-0.00022	0.000164	-0.000083	-0.000812
PCB_154	-0.000638	-0.000227	0.00608	0.006684	-0.006496
PCB_155	0.000013	0.000098	-0.000059	-0.000011	-0.000114
PCB_158	0.045672	-0.055711	0.03737	0.027861	-0.028465
PCB_159	0.000178	0.000213	0.000618	-0.000458	-0.000136
PCB_160	0.000031	0.000138	-0.000085	-0.000052	-0.000042
PCB_161	0.000031	0.000138	-0.000085	-0.000052	-0.000042
PCB_162	0.000908	0.00218	-0.001203	0.004975	-0.010191
PCB_164	0.025021	0.007256	0.019532	0.013732	-0.003221
PCB_165	-0.000483	0.000184	-0.000061	0.002176	-0.001711
PCB_167	0.022905	-0.023707	0.014416	0.00945	0.004775
PCB_169	0.000111	0.000462	-0.000209	-0.000161	-0.000078
PCB_170	0.066938	0.025387	-0.01126	0.005872	0.024983
PCB_172	0.012484	0.021846	-0.004747	0.004026	-0.003099
PCB_174	0.038282	0.114376	-0.048754	-0.012807	-0.006631
PCB_175	0.002597	0.005846	-0.001353	0.000758	-0.001416
PCB_176	0.006071	0.017261	-0.004843	0.000975	-0.005834
PCB_177	0.028274	0.078003	-0.023334	0.00221	-0.016252
PCB_178	0.011185	0.043598	-0.016883	-0.002524	-0.018389
PCB_179	0.015108	0.063619	-0.024989	-0.008738	-0.024359
PCB_181	0.001239	-0.001148	0.001341	0.000577	-0.000061
PCB_182	0.000391	0.000318	-0.000004	-0.000034	-0.000076
PCB_184	0.000061	0.000163	-0.000032	-0.000037	-0.000115
PCB_186	0.000032	0.000087	-0.000049	-0.000026	-0.000052
PCB_187	0.131113	0.467802	-0.113562	-0.00195	-0.13391
PCB_188	0.000063	0.000221	-0.000074	-0.000044	-0.000151
PCB_189	0.002856	-0.000323	0.002087	0.002209	0.001782
PCB_190	0.008723	0.0147	-0.01239	0.002178	0.011592

PCB_191	0.002889	0.003067	-0.000263	0.001352	0.000325
PCB 192	0.000033	0.000137	-0.000078	-0.000035	-0.000043
PCB_194	0.013554	0.025297	-0.01006	0.002821	0.008106
PCB_195	0.006308	0.014866	-0.004961	0.00129	0.000776
PCB_196	0.007938	0.02009	-0.00857	0.000037	0.001077
PCB_201	0.002516	0.009473	-0.00387	-0.000917	-0.002719
PCB_202	0.003577	0.014385	-0.006886	-0.003736	-0.003928
PCB_203	0.014327	0.040841	-0.011831	-0.001523	-0.001016
PCB_204	0.000032	0.000136	-0.000066	-0.000041	-0.000042
PCB_205	0.000818	0.002025	-0.000602	0.00027	0.00004
PCB_206	0.004907	0.017826	-0.008173	-0.004892	-0.001864
PCB_207	0.000657	0.002318	-0.001137	-0.000658	-0.000285
PCB_208	0.001535	0.006847	-0.003286	-0.002479	-0.000772
PCB_209	0.001505	0.009228	-0.004405	-0.003814	-0.000753
PCB_12_13	-0.000725	-0.000017	0.00063	-0.000174	0.000304
PCB_107_124	0.00822	-0.016206	0.004429	-0.014674	0.004979
PCB_110_115	0.042799	-0.061851	-0.570423	0.103308	0.075501
PCB_128_166	0.067176	-0.113548	0.051498	-0.014117	-0.06397
PCB_129_138_163	0.537109	-0.232946	0.322899	-0.066054	-0.01478
PCB_134_143	0.002638	-0.004328	0.002245	-0.00153	0.000996
PCB_135_151	0.023725	0.185602	0.0412	0.035216	-0.05982
PCB_139_140	0.007113	-0.009262	0.017313	0.008574	-0.00561
PCB_147_149	0.180405	0.336164	-0.078912	0.044182	0.024859
PCB_153_168	0.38459	0.038108	0.191942	0.304614	0.148322
PCB_156_157	0.065511	-0.124178	0.08661	-0.028312	0.035024
PCB_171_173	0.020295	0.02295	-0.003229	0.01223	-0.009943
PCB_18_30	-0.032114	0.01436	0.058008	-0.016065	0.06429
PCB_180_193	0.132294	0.222234	-0.16726	-0.017089	0.031818
PCB_183_185	0.047195	0.114673	-0.039045	0.030199	-0.033055
PCB_197_200	0.002588	0.009919	-0.00422	-0.001109	-0.002184
PCB_198_199	0.017532	0.049404	-0.023368	-0.014095	-0.001053
PCB_20_28	-0.051126	0.037853	0.115556	-0.024643	0.038912
PCB_21_33	-0.004024	0.006065	0.015059	-0.006089	0.013589
PCB_26_29	-0.072683	0.020224	0.030493	-0.000755	0.070978
PCB_40_41_71	-0.099968	0.039835	0.045582	0.043058	-0.043347
PCB_44_47_65	-0.321541	-0.082605	0.158204	0.001912	-0.192287
PCB_45_51	-0.083198	0.008701	0.051726	-0.015044	-0.008402
PCB_49_69	-0.407023	-0.029002	0.191819	0.310884	-0.140541
PCB_50_53	-0.150906	0.025697	0.043017	-0.003054	0.090118

PCB_59_62_75	-0.044022	0.018543	0.00001	0.018498	0.013531
PCB_61_70_74_76	0.038881	-0.182265	-0.063287	-0.387881	0.170204
PCB_85_117_116	0.019651	-0.059416	0.014701	-0.026036	-0.112106
PCB_86_87_97_108_119_125	0.021642	-0.358391	-0.143224	-0.27624	-0.274913
PCB_88_91	-0.048544	0.031671	0.042688	0.014836	-0.055878
PCB_90_101_113	0.053871	-0.228322	-0.229768	0.141707	0.476611
PCB_93_98_100_102	-0.017102	-0.000578	0.023753	-0.006137	-0.02534

## 4.1.2.4 Sunfish Tissue – PCA

Pumpkinseed and bluegill fillet samples were grouped together for the PCA. PCA indicates that a three-component model explains 96% of the variability of the congener distributions at the varying Stations, a four-component model 98% and a five-component model 99

Pumpkinseed & BlueGill Fillet Eigenvalues of the Covariance Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	0.00210480	0.00132487	0.5860	0.5860
2	0.00077994	0.00019999	0.2171	0.8031
3	0.00057995	0.00050821	0.1615	0.9646
4	0.00007174	0.00003156	0.0200	0.9846
5	0.00004018		0.0112	0.9958

Plots of three-component models can be found in Appendix F. Principal component loadings for sunfish fillet tissue samples are tabulated below:

Pumpkinseed and BlueGill Fillet: Principal Component Loadings							
PCB Congener	Prin1	Prin2	Prin 3	Prin 4	Prin 5		
PCB_1	0.001091	-0.000722	-0.000501	0.003045	-0.002467		
PCB_2	-0.00007	0.000018	0.000436	-0.000411	-0.000102		
PCB_3	-0.000009	-0.000015	0.000264	0.000141	-0.000446		
PCB_4	0.018012	-0.015896	-0.02004	0.040857	0.019883		
PCB_5	-0.000044	0.000027	0.000393	-0.000038	-0.000056		
PCB_6	0.001469	-0.001258	0.001782	0.002382	-0.003019		
PCB_7	0.00018	-0.000198	-0.000062	0.001353	-0.000495		
PCB_8	0.004307	-0.000336	0.007485	0.016447	-0.019633		
PCB_9	0.000347	-0.000264	0.000076	0.001449	-0.00083		
PCB_10	0.001476	-0.001085	-0.002175	0.006886	-0.001931		
PCB_11	-0.004161	-0.000649	0.00516	-0.007	0.000448		
PCB_14	-0.000062	0.000002	0.000453	-0.000277	0.000299		
PCB_15	0.000909	-0.000062	0.002518	-0.000487	-0.002997		
PCB_16	0.001687	-0.003309	0.000416	-0.012928	0.004758		

PCB_17	0.026688	-0.024224	-0.028838	0.016952	0.01556
PCB_19	0.011514	-0.011604	-0.014607	0.005823	0.025449
PCB_22	0.00514	-0.007408	0.008135	-0.030514	-0.009213
PCB_23	-0.000056	0.000007	0.000418	-0.000289	-0.000172
PCB_24	0.000565	-0.000999	-0.000513	-0.005563	0.007217
PCB_25	0.019098	-0.020548	0.007774	-0.028065	-0.018771
PCB_27	0.028052	-0.02562	0.01067	-0.092272	-0.036274
PCB_31	0.015709	-0.021615	0.020654	-0.031844	-0.042509
PCB_32	0.022845	-0.02459	-0.001929	-0.023678	-0.015957
PCB_34	0.000382	-0.00029	0.00051	-0.001077	-0.000627
PCB_35	-0.000062	0.000002	0.000453	-0.000277	0.000299
PCB_37	0.000271	-0.000783	0.002459	-0.003568	-0.00844
PCB_38	0.00013	-0.000192	0.000176	-0.000584	-0.000567
PCB_39	0.00006	-0.000052	0.000186	-0.000202	-0.000304
PCB_42	0.014721	-0.02138	-0.021055	0.041918	-0.013094
PCB_43	-0.000341	-0.00116	0.004871	-0.019998	-0.001139
PCB_46	0.001583	-0.003121	-0.001391	-0.005026	0.006094
PCB_48	-0.000038	-0.001738	0.000015	-0.006787	0.003592
PCB_52	0.294629	-0.319259	-0.232695	0.477924	0.061262
PCB_54	0.002043	-0.001902	-0.002319	0.002921	0.004786
PCB_55	-0.000486	-0.000339	0.000413	0.001105	0.005002
PCB_56	-0.002149	-0.005094	-0.00853	0.007423	-0.012552
PCB_57	0.005124	-0.004369	0.004562	-0.001565	-0.009855
PCB_58	0.001767	-0.001874	0.001168	0.001281	-0.005311
PCB_60	-0.004778	-0.000936	0.000588	-0.005589	-0.005281
PCB_63	0.003467	-0.001453	0.00427	-0.004207	-0.008783
PCB_64	0.009622	-0.027738	-0.038024	0.06582	-0.021437
PCB_66	0.055793	-0.005506	0.05446	-0.072323	-0.137817
PCB_67	0.005141	-0.004904	0.00309	-0.002679	-0.005443
PCB_68	0.010116	-0.005221	0.009224	-0.004518	-0.012054
PCB_72	0.0144	-0.011595	0.013286	-0.006007	-0.012032
PCB_77	-0.002116	-0.001521	0.002493	-0.004846	-0.003721
PCB_78	-0.000006	-0.000052	0.000286	0.000754	-0.001041
PCB_79	0.00316	0.000733	-0.002108	-0.010778	0.001565
PCB_81	-0.000103	0.000078	-0.000154	-0.000246	-0.000132
PCB_82	0.001458	0.004554	-0.030763	0.012141	0.000154
PCB_83	0.00539	-0.000453	0.002531	-0.015987	-0.030484
PCB_84	0.01133	-0.029546	-0.036985	-0.025569	-0.001643
PCB_89	-0.000387	-0.000598	-0.000654	-0.001166	0.00022
PCB_92	0.069244	-0.02899	0.047624	-0.054997	-0.079149
PCB_94	0.001284	-0.000866	0.001432	-0.005071	-0.003922

PCB_95	0.051278	-0.091892	-0.191146	0.12286	-0.054265
PCB_96	0.000746	-0.001374	-0.001584	-0.001874	0.001201
PCB_99	0.166335	0.130044	0.243632	-0.297879	0.061331
PCB_103	0.005778	-0.003448	-0.003462	0.000656	-0.003656
PCB_104	0.000147	-0.000056	0.000104	0.000012	-0.000454
PCB_105	0.035545	0.140411	0.053207	0.042347	0.079149
PCB_109	0.016056	0.023008	0.023901	0.022089	0.013353
PCB_111	0.000666	-0.000411	0.001639	-0.002196	0.00039
PCB_114	0.002376	0.010066	0.002368	0.005771	0.002078
PCB_118	0.199835	0.351697	0.310943	0.058081	0.209568
PCB_120	0.002381	-0.001508	0.004948	-0.002633	-0.002868
PCB_121	0.000215	-0.000142	0.000376	-0.000262	-0.000263
PCB_122	0.000479	0.003004	0.00172	-0.000165	-0.002117
PCB_123	0.002301	0.006909	0.00485	0.004219	-0.021378
PCB_126	-0.00024	0.00174	-0.001635	0.003523	-0.002834
PCB_127	0.000094	0.001012	0.000335	0.000218	0.000688
PCB_130	-0.008126	0.019297	0.019708	-0.007071	-0.039808
PCB_131	-0.000867	0.001854	-0.000126	0.000194	-0.008101
PCB_132	-0.044443	0.034123	-0.017044	0.059901	-0.112903
PCB_133	-0.001369	0.003057	0.007837	-0.000444	-0.012682
PCB_136	-0.014534	0.001511	-0.028973	-0.008992	-0.043032
PCB_137	0.00497	0.036967	0.009419	0.068744	-0.021252
PCB_141	-0.050623	0.037906	0.015124	0.01821	0.011142
PCB_142	-0.00006	-0.000001	0.000452	-0.000306	0.000281
PCB_144	-0.010426	0.010812	-0.003669	-0.004571	-0.010444
PCB_145	-0.000011	0.00005	0.000285	-0.000238	-0.000518
PCB_146	-0.073823	0.071203	-0.008019	-0.120916	-0.574869
PCB_148	0.00003	0.000183	0.000419	0.00005	-0.001031
PCB_150	0.000047	-0.000009	-0.000363	0.000099	-0.000757
PCB_152	0.000075	-0.000025	-0.00005	-0.000467	-0.000398
PCB_154	0.000516	0.003088	0.004087	-0.000711	-0.00916
PCB_155	-0.000067	0.000022	0.00043	-0.00034	-0.000113
PCB_158	-0.009396	0.04989	0.018914	0.029735	-0.005458
PCB_159	0.000037	0.000079	0.000136	-0.001461	-0.001862
PCB_161	0.010032	-0.015893	0.011371	0.169968	0.392527
PCB_162	-0.000729	0.001748	0.000809	-0.00338	-0.001093
PCB_164	-0.027195	0.019008	-0.007298	0.005275	0.004745
PCB_165	0.00014	-0.000166	0.000736	-0.001307	-0.003607
PCB_167	-0.004256	0.016129	0.00619	0.014523	0.028313
PCB_169	-0.000331	-0.000034	0.000263	-0.000458	-0.00006
PCB_170	-0.033627	0.017738	0.023057	-0.02045	0.120663

PCB_172	-0.016249	0.000983	0.001561	0.004568	0.028663
PCB_174	-0.099032	-0.008328	-0.036077	-0.038113	0.063614
PCB_175	-0.004081	0.000035	-0.000087	-0.002352	0.002086
PCB_176	-0.008138	0.000145	-0.003134	-0.005046	-0.001459
PCB_177	-0.057455	-0.002458	-0.009095	-0.031859	0.023076
PCB_178	-0.027226	-0.002425	-0.002699	-0.01743	0.004368
PCB_179	-0.036259	-0.003552	-0.012619	-0.025559	0.003036
PCB_181	-0.000137	0.000938	0.000429	0.000908	0.002314
PCB_182	-0.000602	-0.000394	0.000462	-0.001675	0.002431
PCB_184	-0.000075	0.00006	0.000382	-0.00023	-0.000118
PCB_186	-0.000072	0.000044	0.000428	-0.000386	-0.000108
PCB_187	-0.561111	-0.081049	-0.179461	-0.227456	0.263139
PCB_188	-0.000099	0.000039	0.000373	-0.000242	-0.000083
PCB_189	-0.001826	0.001265	0.000498	0.000694	0.001387
PCB_190	-0.004334	0.000566	0.00427	-0.008891	0.010761
PCB_191	-0.002734	0.000455	-0.000114	-0.001017	0.004474
PCB_192	-0.000062	0.000002	0.000453	-0.000277	0.000299
PCB_194	-0.014123	-0.000458	0.004421	-0.01197	0.010788
PCB_195	-0.007991	-0.000617	0.001141	-0.006376	0.008196
PCB_196	-0.010469	-0.001176	0.002828	-0.010673	0.007501
PCB_201	-0.006854	-0.001488	-0.000418	-0.005124	0.003124
PCB_202	-0.008956	-0.002167	-0.000195	-0.007906	0.005048
PCB_203	-0.019355	-0.003256	0.003377	-0.018404	0.01441
PCB_204	-0.000062	0.000004	0.000452	-0.000277	0.0003
PCB_205	-0.001506	-0.000195	-0.000203	-0.000792	0.00086
PCB_206	-0.012792	-0.003204	-0.000209	-0.010739	0.008598
PCB_207	-0.00145	-0.00039	0.000159	-0.001277	0.000946
PCB_208	-0.004385	-0.001319	0.000076	-0.004309	0.002995
PCB_209	-0.009223	-0.00312	-0.000618	-0.008747	0.007141
PCB_12_13	0.000473	-0.000276	0.000669	-0.00153	-0.000917
PCB_107_124	0.00324	0.016255	0.004953	0.013038	-0.0058
PCB_110_115	0.211284	-0.092005	-0.499923	-0.413768	0.302698
PCB_128_166	-0.011231	0.092687	0.016895	0.066963	0.032822
PCB_129_138_163	-0.234346	0.374528	0.144237	0.32857	0.138105
PCB_134_143	-0.004328	0.006267	0.00725	-0.005062	-0.055671
PCB_135_151	-0.149297	0.039214	-0.047821	-0.038209	-0.158694
PCB_139_140	0.000294	0.0128	0.004251	0.012239	-0.011101
PCB_147_149	-0.370567	0.129457	-0.2968	0.328408	-0.200487
PCB_153_168	-0.21569	-0.629371	0.551383	0.039783	0.047399
PCB_156_157	0.00736	0.066415	0.02253	0.042827	0.037821
PCB_171_173	-0.023628	0.006714	-0.004796	0.005754	0.031821

PCB_18_30	0.014171	-0.021778	-0.019541	-0.006067	0.020793
PCB_180_193	-0.108026	0.002093	0.036097	-0.08382	0.212537
PCB_183_185	-0.073303	0.002157	-0.010403	-0.016112	0.051477
PCB_197_200	-0.004454	-0.000736	-0.000133	-0.00408	0.001731
PCB_198_199	-0.027146	-0.003641	0.00756	-0.03092	0.019214
PCB_20_28	0.023621	-0.033977	0.033462	-0.061292	-0.08713
PCB_21_33	0.001213	-0.002807	0.003515	-0.010146	0.00117
PCB_26_29	0.0505	-0.061362	0.028416	-0.109517	-0.016723
PCB_40_41_71	0.024232	-0.030918	-0.015462	-0.00312	-0.027049
PCB_44_47_65	0.161915	-0.097107	0.075809	-0.081448	-0.17797
PCB_45_51	0.016749	-0.021299	-0.039088	0.079273	0.0231
PCB_49_69	0.235159	-0.206047	-0.075446	0.222456	0.010186
PCB_50_53	0.029362	-0.035877	-0.015987	-0.048283	-0.000688
PCB_59_62_75	0.013927	-0.022671	0.004289	0.000183	-0.027925
PCB_61_70_74_76	0.057669	0.002968	0.007493	0.019648	-0.052165
PCB_85_117_116	0.028192	0.052785	0.068447	-0.123849	-0.006272
PCB_86_87_97_108_119_125	0.135261	0.10022	-0.061349	-0.110374	-0.162805
PCB_88_91	0.018196	-0.011159	-0.043058	0.023208	-0.020068
PCB_90_101_113	0.227051	0.230017	0.08423	0.083961	0.082313
PCB_93_98_100_102	0.010115	-0.001785	0.002187	-0.012828	-0.029706
PCB_88_91	0.018196	-0.011159	-0.043058	0.023208	-0.020068
PCB_90_101_113	0.227051	0.230017	0.08423	0.083961	0.082313
PCB_93_98_100_102	0.010115	-0.001785	0.002187	-0.012828	-0.029706

One sample for each species was collected at Station 5 and plots of the PCs show the two samples in the same spatial vicinity of each other. This provides supporting evidence that the analysis could accommodate both species in one model. Plots show samples from Stations 2, 4, 5 and 6 grouped together, a combination of pumpkinseed and bluegill fillet samples. The pumpkinseed fillet sample from Station 3 is distanced from these four stations along the Prin 2 and Prin 3 axes. The pumpkinseed sample collected upstream stands alone from the others as does the bluegill sample from Spring Lake.

This supports the speculation of an outside factor influencing PCB congener distributions in the reach between Station 2 and Station 3.

PCA of the PCB congener data for sunfish carcass tissue showed that a three-component system will explain 98% of the variability:

Pumpkinseed & Blue Gill Carcass

#### Eigenvalues of the Covariance Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	0.00185091	0.00110697	0.6790	0.6790
2	0.00074394	0.00064284	0.2729	0.9520
3	0.00010110		0.0371	0.9891

Tabulated PC loadings are below and three-component plots can be found in Appendix F.

Pumpkinseed and Blue	Gill Carcass: Principal	Component Loadin	igs
PCB Congener	Prin1	Prin2	Prin 3
PCB_1	0.001224	-0.000053	0.002183
PCB_2	-0.000038	0.000012	-0.000089
PCB_3	0.000059	-0.000117	0.000035
PCB_4	0.022918	0.015693	0.039464
PCB_5	0.000024	0.000069	0.000145
PCB_6	0.00205	-0.000854	-0.002789
PCB_7	0.00041	0.000033	0.000353
PCB 8	0.005414	-0.004538	0.000493
PCB 9	0.000516	-0.000001	0.000126
PCB 10	0.001894	0.001388	0.004304
PCB 11	-0.000671	-0.000258	-0.002256
PCB 14	-0.000043	0.000022	-0.000094
PCB 15	0.001211	-0.002375	-0.001338
PCB 16	0.002155	0.001956	-0.002485
PCB 17	0.031037	0.026084	0.033243
PCB 19	0.013864	0.01256	0.019421
PCB 22	0.004072	0.003306	-0.011231
PCB 23	-0.000007	0.000039	-0.000098
PCB 24	0.000217	0.000475	0.002203
PCB 25	0.02183	0.007627	-0.028112
PCB 27	0.028125	0.00094	-0.046881
PCB 31	0.019296	0.006592	-0.042763
PCB 32	0.02413	0.014346	-0.009106
PCB 34	0.000403	-0.000113	-0.000932
PCB 35	-0.000037	0.000016	0.000082
PCB 36	-0.000043	0.000022	-0.000094
PCB 37	0.00056	-0.000579	-0.003789
PCB 38	0.000194	0.000245	-0.000245
PCB 39	0.000079	0.00013	-0.000046
PCB 42	0.025674	0.028955	-0.003963
PCB 43	0.000661	-0.001292	-0.010905
PCB 46	0.002428	0.003109	-0.002669
PCB 48	0.000601	0.003128	-0.004746
PCB 52	0.377277	0.27881	0.089737
PCB 54	0.002951	0.002606	0.003761
PCB 55	-0.000043	0.000022	-0.000094
PCB 56	0.000803	0.013182	-0.002835

PCB_57	0.005831	-0.002568	-0.016259
PCB 58	0.00149	-0.000173	-0.003946
PCB 60	-0.004522	0.003461	-0.010346
PCB 63	0.003885	-0.001369	-0.007595
PCB 64	0.023039	0.049328	0.00871
PCB 66	0.05752	-0.018673	-0.078855
PCB 67	0.006149	0.000561	-0.009196
PCB 68	0.011084	-0.004353	-0.017529
PCB 72	0.016234	-0.004706	-0.030645
PCB 73	-0.000043	0.000022	-0.000094
PCB 77	-0.002196	0.000991	-0.008164
PCB 78	-0.000133	0.000094	-0.00019
PCB 79	0.001346	0.00126	0.001047
PCB 80	-0.000042	0.000023	-0.000097
PCB_81	-0.000272	0.000221	-0.000813
PCB_82	0.000171	0.021715	0.051491
PCB_83	0.007621	-0.000771	-0.021053
PCB_84	0.017481	0.043151	-0.011586
PCB_89	-0.00053	0.001349	-0.000688
PCB_92	0.066093	-0.080897	-0.160775
PCB_94	0.001314	-0.00077	-0.004992
PCB_95	0.084915	0.208842	-0.05554
PCB_96	0.001102	0.002109	-0.000133
PCB_99	0.14814	-0.286721	-0.227785
PCB_103	0.006416	0.002313	-0.0015
PCB_104	0.000246	0.00009	0.000201
PCB_105	0.013208	-0.10493	0.088723
PCB_106	-0.000043	0.000022	-0.000094
PCB_109	0.014615	-0.033337	0.003032
PCB_111	0.000848	-0.000898	-0.002994
PCB_112	-0.000043	0.000022	-0.000094
PCB_114	0.000339	-0.008825	0.018688
PCB_118	0.109589	-0.383624	-0.047441
PCB_120	0.002925	-0.003545	-0.00935
PCB_121	0.000295	-0.000307	-0.000849
PCB_122	-0.000376	-0.001043	0.001303
PCB_123	0.001056	-0.003397	0.000157
PCB_126	-0.000356	0.000179	-0.001181
PCB_127	-0.000144	-0.000545	0.000599
PCB_130	-0.009579	-0.024904	-0.01103
PCB_131	-0.000661	-0.000117	-0.000351

PCB_132	-0.025752	0.019856	-0.025023
PCB_133	-0.001282	-0.007297	-0.01005
PCB_136	-0.010108	0.022038	0.02284
PCB_137	0.002208	-0.033743	0.070542
PCB_141	-0.041766	-0.029758	0.018161
PCB 142	-0.000043	0.000022	-0.000094
PCB_144	-0.012008	-0.000485	0.012465
PCB_145	-0.000024	0.000002	-0.000099
PCB_146	-0.061308	-0.01698	0.011316
PCB_148	0.000025	-0.000498	-0.000442
PCB_150	0.000026	0.000205	0.000209
PCB_152	0.000042	0.000067	-0.000205
PCB_154	-0.000406	-0.005312	-0.002832
PCB_155	-0.000034	-0.000011	-0.000115
PCB_158	-0.014598	-0.047507	0.051204
PCB_159	0.000142	0.000313	-0.000253
PCB_160	-0.000043	0.000022	-0.000094
PCB_161	-0.000043	0.000022	-0.000094
PCB_162	-0.000143	-0.000818	-0.002008
PCB_164	-0.026573	-0.001619	0.016047
PCB_165	0.000309	-0.000466	-0.00152
PCB_167	-0.007839	-0.021519	0.009171
PCB_169	-0.00043	0.000256	-0.000505
PCB_170	-0.056206	-0.008102	0.0101
PCB_172	-0.017186	0.004076	-0.008958
PCB_174	-0.07868	0.045079	-0.032876
PCB_175	-0.003995	0.000758	-0.00366
PCB_176	-0.007346	0.003696	-0.004212
PCB_177	-0.052576	0.016898	-0.050671
PCB_178	-0.026858	0.009609	-0.02991
PCB_179	-0.032692	0.019185	-0.025848
PCB_181	-0.000446	-0.001135	0.001152
PCB_182	0.000137	-0.000639	0.000301
PCB_184	-0.000107	0.000014	-0.000141
PCB_186	-0.000037	0.000015	-0.000043
PCB_187	-0.539724	0.339211	-0.336808
PCB_188	-0.000169	0.000058	-0.000251
PCB_189	-0.002037	-0.000312	0.001719
PCB_190	-0.010709	0.000502	0.000291
PCB_191	-0.002982	0.000072	-0.000495
PCB_192	-0.000044	0.000021	-0.000084

PCB_194	-0.017766	0.009039	-0.011531
PCB_195	-0.01048	0.005659	-0.00694
PCB_196	-0.014711	0.006875	-0.013879
PCB_201	-0.006308	0.003531	-0.007496
PCB 202	-0.00928	0.005236	-0.011687
PCB 203	-0.028556	0.015523	-0.028112
PCB_204	-0.000046	0.000022	-0.000082
PCB 205	-0.001556	0.000884	-0.001197
PCB 206	-0.011062	0.006334	-0.013885
PCB 207	-0.001241	0.000669	-0.001727
PCB 208	-0.003819	0.002162	-0.005698
PCB 209	-0.00689	0.004946	-0.009386
PCB 12 13	0.000597	-0.000597	-0.00128
PCB 107 124	0.001076	-0.010473	0.017486
PCB 110 115	0.142351	0.389629	0.520299
PCB 128 166	-0.022861	-0.069843	0.105827
PCB 129 138 163	-0.279888	-0.366821	0.403925
PCB 134 143	-0.003723	-0.008766	-0.019317
PCB 135 151	-0.14803	0.047896	-0.012434
PCB 139 140	-0.000837	-0.011888	0.010026
PCB 147 149	-0.299473	0.182403	0.353252
PCB 153 168	-0.228319	-0.25266	-0.017479
PCB 156 157	-0.007349	-0.061332	0.079816
PCB 171 173	-0.02481	0.000836	-0.002362
PCB 18 30	0.017803	0.021964	0.008257
PCB 180 193	-0.165447	0.037756	-0.123095
PCB 183 185	-0.06615	0.009348	-0.067081
PCB 197 200	-0.005116	0.00284	-0.005059
PCB 198 199	-0.044565	0.0273	-0.041234
PCB 20 28	0.029234	0.013226	-0.069484
PCB 21 33	0.001927	0.002016	-0.002711
PCB 26 29	0.055924	0.018901	-0.096866
PCB 40 41 71	0.032839	0.031739	-0.032069
PCB 44 47 65	0.197037	-0.014719	-0.224726
PCB 45 51	0.024571	0.039372	0.041582
PCB 49 69	0.31399	0.140072	-0.126855
PCB 50 53	0.038864	0.028499	-0.027675
PCB 59 62 75	0.01996	0.008706	-0.036373
PCB 61 70 74 76	0.076054	0.009491	0.024039
PCB 85 117 116	0.012876	-0.074849	0.032501
PCB 86 87 97 108 119 125	0.119495	-0.017362	0.042838

PCB_88_91	0.01983	0.034016	0.034823
PCB_90_101_113	0.155213	-0.263235	0.246741
PCB 93 98 100 102	0.007608	-0.003428	-0.014649

One sample for each sunfish species was collected at Station 5 and plots of the PCs show the two samples in the same spatial vicinity of each other. Similarly to the sunfish fillet plots, Stations 2, 4, 5 and 6 are grouped together. The pumpkinseed fillet sample from Station 3 is distanced from these four stations along the Prin 2 and Prin 3 axes with its greatest difference along Prin 3. The pumpkinseed sample collected upstream stands alone from the others as does the bluegill sample from Spring Lake

#### 4.1.3 Polytopic Vector Analysis

Often there is little, if any, knowledge of the chemical composition of the "mixed" sources involved in an environmental study. PVA is a multivariate statistical tool which can assist in identifying the mixing components; in this study, the distribution of congeners along the sampled reaches of the Bound Brook. PVA is a type of factor analysis known as a self-training receptor model. Self-training receptor models can resolve three parameters of concern in a multivariate, mixed chemical system: the number of components in a mixture (number of sources), the chemical composition/fingerprints of each component and the relative proportions of each component in each sample.

For PVA to be applied, the data must meet certain assumptions. First, the system (Bound Brook) must contain more variables (PCB congeners) or samples, whichever is the smaller number, than there are sources. Additionally, the relative proportions of congeners in each source must be fixed and source contributions assumed to be linearly additive. In other words, as the proportion of a source fingerprint increases within each sample, the PCB congeners that are characteristic of the fingerprint will increase proportionally (linearly) in that sample.

Traditional PVA is based on PCA; however the mathematical process involves iteratively rotating axes and shifting principal components axes (known as end members in PVA) until the system contains only positive sample loadings (Barnabas *et. al.*, 2004). Orthogonality may not be preserved as it is in PCA. In this case, the resulting models will demonstrate only zero or positive contributions of individual PCB congeners to the mixture. Again, this was considered an exploratory analysis. Further investigation of the biological, chemical, and physical processes that can affect these models is recommended. However, these analyses were a first step in decomposing the "mixture" of possible PCB sources present in the Bound Brook.

Software to run the PVA was not commercially available at the time the analyses were run, however Robert Erlich (C&E Associates, Salt Lake City, Utah) kindly provided a draft version of PVA software to use. The software included modules to:

- 1. transform the data to become proportionate (individual congener concentrations were transformed to become a proportion of their totals)
- 2. determine appropriate numbers of end members (fingerprints) in each sample through:
  - a. the computation of eigenvalues/eigenvectors and the change in explained variance associated with the inclusion of each subsequent eigenvector,
  - b. computation of the Klovan/Miesch Coefficient of Determination (KMCD); the ratio between the variance associated with a variable (each congener as a % of the total PCB concentration) and the back-calculated value of the variable if the model was imposed
  - c. and the comparison of measured values to back-calculated values through scatter plots of incrementally increasing end members, Johnson Coefficient of Determination (JCD) plots,
- 3. determine the composition of the end members (identify the components of the fingerprints),
- 4. determine the relative proportion of each end member (fingerprint) in each sample.

The number of principal components identified through PCA for Asiatic Clam and fish tissue were used as a starting point for the determination of the appropriate number of end members to be computed in the PVAs. KMCD values and JCD plots were examined to determine concurrence with the PCA results. KMCD values can range from 0 to 1; the closer to 0 the less the associated variable contributes to the model with the given number of end members. If  $\kappa=$  the number of end members in the model, Robert Ehrlich states in his software documentation "as a rule of thumb, values greater than 0.5 can support a  $\kappa$  end member solution, values greater than 0.7 provide strong support and values greater than 0.9 provide very strong support." This rule of thumb was applied when evaluating the Bound Brook PCB data. JCD plots were used to verify that the appropriate number of end members had been selected and to evaluate the data for potential outliers.

PVA was run multiple times on the Asiatic Clam data to determine how non-detects would influence the analyses. Analyses were run with non-detects replaced with their reporting limit and then again replaced with zero. Following these computations and a review of the mathematical process, it was determined that replacing non-detects with zeros was the most appropriate option.

Although PVA is constrained to positive or zero loadings, the PVA software permits very small negative numbers (close to zero). This very small number is controlled by the user and represents a "zero" contribution to the mixture.

PVA is an iterative process that requires an initial starting point. Software default options were used to begin the mathematical processes. Detailed statistical output can be found in Appendix F.

#### 4.1.3.1 Asiatic Clams PVA

PVA was conducted on the Asiatic clam congener data set prior to attempting PVA with the fish tissue data. It is believed that because clams are stationary, as compared to fish, fewer environmental variables would impact the modeling process.

Measurements for 149 PCB congeners in clam tissue samples for Stations 1, 2, 3, 4, and 5 were modeled using PVA. PCA indicated a three "fingerprint" solution. PVA was initialized evaluating the possibility of a four end member solution to confirm that a three end member solution would suffice. KMCDs and JCD plots were examined. A three end member model resulted in 19 congeners with a KMCD <0.5; a four end member model resulted in all KMCDs  $\geq$  0.78. Based on this information a four end member model was chosen. Below is a list of the resulting end member compositions copied from the PVA output:

Asiatic Cl	am	Tiss	ue
Compositions	οf	End	Members

		EM 1	EM 2	EM 3	EM 4
1	PCB 1	0.0283	0.0020	0.0580	0.0347
2	PCB 2	0.0001	0.0000	0.0004	-0.0000
3	PCB 3	0.0016	0.0010	0.0064	0.0039
4	PCB 4	0.9405	0.1458	2.5319	1.3273
5	PCB 5	0.0021	-0.0001	0.0007	0.0044
6	PCB 6	0.0725	0.0274	0.0705	0.1065
7	PCB 7	0.0048	0.0021	0.0076	0.0086
8	PCB_8	0.1155	0.0349	0.1103	0.2248
9	PCB_9	0.0077	0.0029	0.0052	0.0135
10	PCB_10	0.0441	0.0052	0.1071	0.0594
11	PCB 12 13	0.0402	0.0045	0.1185	0.0574
12	PCB 15	0.0845	0.0247	0.1405	0.1468
13	PCB_16	0.1855	0.1684	0.1044	0.2497
14	PCB_17	0.5841	0.2024	0.9055	0.6055
15	PCB_18_30	0.6632	0.4477	0.3504	0.6837
16	PCB_19	0.5017	0.0773	1.1614	0.6214
17	PCB_20_28	0.5813	0.4454	0.4114	0.7020

18 PCB 21 33	0.0721	0.0846	0.0201	0.0968
19 PCB 22	0.1415	0.1693	0.0605	0.1657
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20 PCB_23	0.0004	0.0000	0.0000	0.0004
21 PCB_24	-0.0002	0.0057	-0.0000	0.0000
22 PCB 25	0.3158	0.1261	0.2614	0.1958
23 PCB 26 29	0.5914	0.2718	0.2642	0.2818
24 PCB 27	1.5574	0.0790	2.3287	0.9221
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25 PCB_31	0.3374	0.2273	0.1465	0.3564
26 PCB 32	0.3986	0.1582	0.4333	0.3678
27 PCB 34	0.0067	-0.0000	0.0082	0.0063
28 PCB 35	0.0040	0.0070	0.0024	0.0043
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29 PCB_37	0.0912	0.0869	0.0592	0.1156
30 PCB_38	0.0056	-0.0000	-0.0000	0.0016
31 PCB 39	0.0037	0.0053	0.0044	0.0042
32 PCB 40 41 71	1.0081	0.8971	1.1565	0.9005
33 PCB 42	0.8904	0.8543	0.9699	0.6402
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34 PCB_43	0.0451	0.0434	0.0549	0.0395
35 PCB_44_47_65	4.1101	2.9437	4.9390	3.4416
36 PCB 45 51	0.7653	0.4645	1.0167	0.6126
37 PCB 46	0.2361	0.1159	0.1790	0.1340
38 PCB 48	0.1002	0.1892	0.1210	0.1347
_				
39 PCB_49_69	3.6112	1.1814	2.6102	1.9924
40 PCB 50 53	2.1604	0.7919	2.0709	1.0344
41 PCB 52	4.9373	3.0329	4.6649	3.5260
42 PCB 54	0.0611	0.0041	0.0816	0.0418
43 PCB 56	0.2899	0.4418	0.2643	0.3253
44 PCB_57	0.0755	0.0170	0.0115	0.0187
45 PCB 58	0.0219	0.0133	0.0122	0.0101
46 PCB 59 62 75	0.5154	0.2090	0.1183	0.1557
47 PCB 60	0.0818	0.1377	0.0762	0.1188
48 PCB 61 70 74 76	1.9702	1.7045	2.2722	2.1887
49 PCB_63	0.0715	0.0416	0.0608	0.0588
50 PCB_64	0.6218	0.5483	0.4014	0.5569
51 PCB 66	1.4149	0.9877	1.5550	1.4023
52 PCB 67	0.0871	0.0538	0.0371	0.0496
53 PCB 68	0.1283	0.0209	0.1054	0.0651
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54 PCB_72	0.1777	0.0342	0.0768	0.0572
55 PCB 73	0.0019	0.0002	0.0002	0.0501
56 PCB 77	0.0498	0.0971	0.0286	0.0553
57 PCB 79	0.0433	0.0528	0.0689	0.0444
58 PCB 81	0.0026	0.0060	0.0031	0.0038
<del>-</del>				
59 PCB_82	0.3132	0.4066	0.4275	0.3957
60 PCB_83	0.3269	0.3220	0.2581	0.2966
61 PCB 84	1.1632	1.2196	1.2633	1.0784
62 PCB 85 117 116	0.8401	0.7928	0.9776	0.9091
63 Coplanar1	3.4735	3.2877	4.4443	3.5597
64 PCB_88_91	0.9903	0.9038	0.9094	0.7944
65 PCB_89	0.0250	0.0604	0.0301	0.0294
66 PCB_90_101_113	5.9932	5.2934	6.9048	5.9391
67 PCB 92	1.5202	1.2513	1.3364	1.1933
68 Coplanar2	0.3438	0.2894	0.4369	0.3122
	0.0767	0.0376	0.0991	
69 PCB_94				0.0644
70 PCB_95	6.0087	6.5369	6.4338	4.7742
71 PCB_96	0.0527	0.0398	0.0462	0.0360
72 PCB 99	3.6148	2.5436	3.8783	3.1242
73 PCB 103	0.1005	0.0486	0.0740	0.0581
74 PCB 104				
	0.0047	-0.0000	0.0064	0.0034
75 PCB_105	1.2037	1.0025	1.6787	1.5136
76 PCB_107_124	0.1562	0.1568	0.1938	0.1628
77 PCB 109	0.3681	0.2293	0.3678	0.3224
78 PCB 110 115	6.4737	6.3456	6.9665	5.8628
79 PCB 111	0.0131	0.0030	0.0051	
_				0.0036
80 PCB_114	0.0646	0.0555	0.0939	0.0891
81 PCB_118	6.0860	4.7346	7.5000	5.9970
82 PCB 120	0.0439	0.0175	0.0170	0.0178
83 PCB 121	0.0041	0.0000	0.0025	0.0018
84 PCB 122	0.0376	0.0494	0.0483	0.0438
<del>-</del>				
85 PCB_123	0.0916	0.1105	0.0945	0.0871
86 PCB_127	0.0035	0.0054	0.0046	0.0040
87 PCB 128 166	0.8073	0.8490	0.6233	1.1126
88 PCB 129 138 163	6.2443	7.7913	5.2177	8.0276

89 PCB 130	0.3303	0.4282	0.2983	0.4253
<del>_</del>				
90 PCB_131	0.0851	0.1235	0.0915	0.1147
91 PCB 132	1.5226	2.0047	1.4309	1.8820
92 PCB 133	0.0962	0.1083	0.0641	0.0905
93 PCB 134 143	0.3066	0.3476	0.2594	0.3491
94 PCB_135_151	1.5940	2.8310	1.1328	2.0262
95 PCB 136	0.5978	0.7521	0.4779	0.6919
96 PCB 137	0.1343	0.1651	0.1679	0.1540
97 PCB 139 140	0.1254	0.1234		0.1404
			0.1100	
98 PCB_141	0.0842	0.2056	0.1161	0.1579
99 PCB 142	0.0000	0.0000	0.0000	0.0006
100 PCB 144	0.1764	0.3323	0.1511	0.2716
<del>-</del>				0.0026
101 PCB_145	0.0022	0.0023	0.0022	
102 PCB_146	0.8177	1.2072	0.6093	0.9832
103 PCB 147 149	3.9579	5.8965	3.1563	4.6656
104 PCB 148	0.0077	0.0081	0.0073	0.0074
<del>_</del>				
105 PCB_150	0.0081	0.0071	0.0068	0.0074
106 PCB_152	0.0072	0.0067	0.0084	0.0079
107 PCB 153 168	8.3300	11.8291	6.1218	9.4953
108 PCB 154	0.0713	0.0631	0.0525	0.0631
109 PCB 155	0.0004	-0.0000	0.0005	0.0000
110 PCB_156_57	0.3755	0.3634	0.3849	0.3774
111 PCB_158	0.5817	0.6974	0.5116	0.8383
112 PCB 159	0.0000	0.0000	0.0000	0.0006
113 PCB 162	0.0100	0.0214	0.0083	0.0083
114 PCB 164	0.1847	0.3059	0.1723	0.2670
_				
115 PCB_165	0.0065	0.0026	0.0015	0.0017
116 PCB 167	0.4100	0.4768	0.3522	0.3451
117 PCB 169	0.0007	0.0021	0.0018	0.0067
118 PCB 170	0.1123	0.2803	0.0708	0.1874
<del>-</del>		0.4464		
119 PCB_171_173	0.2184		0.1043	0.4544
120 PCB_172	0.0095	0.0390	0.0070	0.0152
121 PCB 174	0.0815	0.3759	0.0525	0.1657
122 PCB 175	0.0210	0.0759	0.0104	0.0455
123 PCB 176	0.0714	0.2132	0.0339	0.1442
124 PCB_177	0.3052	0.8417	0.1374	0.6758
125 PCB_178	0.1014	0.3807	0.0459	0.2031
126 PCB 179	0.1804	0.6595	0.0831	0.3601
127 PCB 180 193	0.4346	1.5651	0.2309	0.7274
128 PCB 181	0.0095	0.0117	0.0072	0.0120
129 PCB_182	0.0013	0.0032	0.0011	0.0023
130 PCB_183_185	0.3593	1.0284	0.1470	0.7780
131 PCB 184	0.0006	0.0000	0.0005	0.0006
132 PCB 187	0.6383	2.3172	0.2590	1.4234
133 PCB 188	0.0007	0.0023	0.0007	0.0007
134 PCB_189	0.0044	0.0092	0.0031	0.0060
135 PCB 190	0.0984	0.2030	0.0458	0.1141
136 PCB 191	0.0161	0.0374	0.0076	0.0332
137 PCB 194	0.0049	0.0299	0.0024	0.0076
<del>-</del>				
138 PCB_195	0.0323	0.1117	0.0084	0.0738
139 PCB_196	0.0160	0.0863	0.0054	0.0333
140 PCB 197 200	0.0103	0.0571	0.0035	0.0223
141 PCB 198 199	0.0188	0.1662	0.0108	0.0368
142 PCB 201	0.0167	0.0986	0.0057	0.0393
<del>-</del>				
143 PCB_202	0.0187	0.1392	0.0093	0.0394
144 PCB_203	0.0724	0.3211	0.0239	0.1485
145 PCB_205	0.0050	0.0156	0.0013	0.0116
146 PCB 206	0.0055	0.0428	0.0037	0.0096
147 PCB 207	0.0012	0.0093	0.0009	0.0022
148 PCB 208	0.0014	0.0196	0.0016	0.0025
149 PCB_209	0.0007	0.0195	0.0017	0.0014

The proportion of each end member (PCB fingerprint) that makes up the "PCB mixture" found in Asiatic clams located at each station is:

ASIATIC CLAM PCB Congener MIXING PROPORTIONS							
Sample	EM 1	EM 2	EM 3	EM 4			
1 1-AC-3	-0.0000	1.0000	-0.0000	0.0000			
2 2-AC-3	-0.0000	0.0000	1.0000	-0.0000			
3 3-AC-3	-0.0000	0.0000	-0.0000	1.0000			
4 4-AC-3	1.0000	0.0000	-0.0000	0.0000			
5 5-AC-3	0.9059	0.0653	0.1037	-0.0749			

This infers that the PCB "mixture" in Asiatic clam tissue at Station 1 (1-AC-3) consists entirely (100%) of the PCB fingerprint defined by the congener composition of End Member (EM) 2. Likewise, Station 2's PCB "mixture" is 100% the PCB fingerprint defined by EM 3, Station 3 100% by EM 4, and Station 4 100% by EM 1. Station 5 however can be seen as a "mixture" of PCB fingerprints with  $\sim$  (approximately) 90% of the mixture defined by EM 1,  $\sim$ 10% defined by EM 3, and  $\sim$ 7% defined by EM 2. Because the PVA software allows for very small negative numbers (EM 4 for Station 4 = -0.0749), some of the mixtures will sum to greater than 100%.

The general interpretation based on the models supports theories which were developed during the examination of the bar charts and PCA results. A unique PCB fingerprint emerged for Station 1, Station 2, Station 3, and Station 4. Station 5 is located just downstream from Station 4. Its PCB fingerprint was 90% similar to Station 4 with a small percentage of the PCB mixtures from the other stations. As PCBs migrate down the Bound Brook, weathering and other environmental factors are expected to affect the PCB mixture so the small differences between the PCB mixtures at Stations 4 and 5 were expected. Once again, a unique PCB fingerprint was derived for each of Stations 2 and 3. This supports the possibility of an additional PCB source located between the two stations. Resources beyond those allocated to this study would be required to correlate these four end member fingerprints with known Aroclors.

#### 4.1.3.2 White Sucker Fillet and Carcass – PVAs

Measurements for 153 PCB congeners in white sucker fillet tissue samples and 163 PCB congeners in white sucker carcass tissue samples for Stations 1, 2, 3, 4, 5, 6 and 7 were modeled using PVA. Fillet and carcass samples were evaluated individually but systematically with the analyst moving back and forth between the two types of samples. It was expected that the same number of end members could explain the distribution of PCB congeners in both the white sucker fillet and carcass tissue samples although the mixtures would be different. PCA indicated a three to five "fingerprint" solution for both fillet and carcass congeners. PVA was initialized evaluating the possibility of a six end member system for each (fillet and carcass). Examination of the computed KMCDs and JCD plots indicated a six EM solution would be representative of both the fillet and carcass PCB distributions. The analyses were run with the understanding that many more environmental factors can affect PCB loadings in fish due to their mobility as compared to the clams.

Below are the congener compositions and mixing proportions for a 6 mixture system in white sucker fillet tissue samples:

				illet Tissue End Members			
		EM 1	EM 2	EM 3	EM 4	EM 5	EM 6
1	PCB_1	0.0031	0.0053	0.0038	0.0062	0.0166	0.0086
2	PCB_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001

3	PCB_3	0.0001	0.0002	0.0000	0.0002	0.0005	0.0002
4	PCB_4	0.2489	0.0821	0.0562	0.1342	0.3139	0.2108
5	PCB_5	0.0000	0.0003	0.0000	0.0000	0.0011	0.0005
6	PCB_6	0.0363	0.0107	0.0129	0.0168	0.0483	0.0283
7	PCB_7	0.0045	0.0019	0.0020	0.0022	0.0066	0.0037
8	PCB_8	0.0561	0.0512	0.0311	0.0278	0.1356	0.0694
9	PCB_9	0.0086	0.0032	0.0031	0.0035	0.0120	0.0064
10	PCB_10	0.0284	0.0077	0.0054	0.0146	0.0325	0.0229
11	PCB_11	0.0223	0.0018	-0.0003	0.0016	0.0126	0.0110
12	PCB_12_13	0.0080	0.0016	0.0000	0.0042	0.0042	0.0053
13	PCB_14	0.0004	-0.0014	0.0003	0.0055	-0.0011	0.0064
14	PCB_15	0.0064	0.0027	0.0067	0.0033	0.0111	0.0058
15	PCB_16	0.1242	0.0228	0.0733	0.0553	0.1176	0.0988
16	PCB_17	0.9338	0.1826	0.1434	0.4419	0.5616	0.6202
17	PCB_18_30	0.5024	0.0366	0.1788	0.1724	0.2905	0.3432
18	PCB_19	0.4817	0.1180	0.0656	0.1979	0.3680	0.3021
19	PCB_20_28	0.9415	0.1501	0.5033	0.5584	0.8494	0.6980
20	PCB_21_33	0.0860	0.0117	0.0653	0.0371	0.0820	0.0534
21	PCB_22	0.1264	0.0049	0.0893	0.0614	0.1366	0.0870
22	PCB_23	0.0012	-0.0001	0.0000	0.0004	0.0008	0.0005
23	PCB_24	0.1787	0.0283	0.0558	0.0977	0.1109	0.1460
24	PCB_26_29	0.7450	0.0338	0.1611	0.3337	0.2408	0.4693
25	PCB_27	1.1340	0.1352	0.0667	0.5250	0.4389	0.7903
26	PCB_31	0.3457	0.0235	0.1967	0.1175	0.2939	0.2598
27	PCB_32	0.7053	0.1017	0.1761	0.3405	0.4426	0.4345
28	PCB_34	0.0129	0.0027	0.0027	0.0073	0.0079	0.0088
29	PCB_35	0.0003	0.0003	0.0000	0.0002	0.0002	-0.0001
30	PCB_37	0.0196	0.0042	0.0006	0.0157	0.0313	0.0194
31	PCB_38	0.0027	0.0005	0.0000	0.0031	0.0001	0.0027
32	PCB_39	0.0019	0.0011	0.0026	0.0017	0.0024	0.0016
33	PCB_40_41_71	1.6440	0.4160	0.8177	1.3301	0.7911	1.4250
34	PCB_42	0.8769	0.1805	0.4577	0.6448	0.5173	0.8275
35	PCB_43	0.0195	-0.0057	0.0405	0.0714	0.0287	0.1086
36	PCB_44_47_65	5.2857	1.9128	2.0849	4.1831	3.0201	5.0949
37	PCB_45_51	1.3020	0.2645	0.4102	0.7492	0.5514	0.9798
38	PCB_46	0.3645	0.0390	0.1209	0.1718	0.1137	0.2598
39	PCB_48	0.1353	0.0448	0.1342	0.0737	0.1120	0.1165
40	PCB_49_69	6.1048	1.1239	1.6137	4.6760	2.4689	5.5813
41	PCB_50_53	1.9293	0.1808	0.4100	1.0138	0.5123	1.4584
42	PCB_52	4.2272	1.4250	1.7613	2.1022	1.5848	3.1607
43	PCB_54	0.0702	0.0146	0.0065	0.0267	0.0288	0.0450
44	PCB_55	0.2236	0.1628	0.2866	0.1807	0.2651	0.2395
45	PCB_57	0.0456	0.0186	0.0108	0.0654	0.0225	0.0420

46	PCB_58	0.0338	0.0057	0.0112	0.0275	0.0151	0.0285
47	PCB_59_62_75	0.5556	0.0030	0.1764	0.3653	0.1282	0.4819
48	PCB_60	0.1176	0.0840	0.1883	0.1045	0.1666	0.1221
49	PCB_61_70_74_76	2.0070	2.0820	1.6359	1.3943	2.0682	1.8837
50	PCB_63	0.0956	0.0452	0.0533	0.0984	0.0921	0.1019
51	PCB_64	1.1077	0.2731	0.7499	0.8049	0.7746	0.9881
52	PCB_66	1.6300	0.9705	1.1447	1.8244	1.6995	1.7431
53	PCB_67	0.0346	0.0045	0.0157	0.0234	0.0217	0.0344
54	PCB_68	0.1716	0.0519	0.0288	0.1941	0.0904	0.1714
55	PCB_72	0.2432	0.0293	0.0422	0.2307	0.0851	0.2135
56	PCB_77	0.0383	0.0127	0.0670	0.0316	0.0394	0.0415
57	PCB_78	0.0129	0.0000	0.0249	-0.0023	0.0213	0.0012
58	PCB_79	0.0274	0.0419	0.0783	0.0655	0.0696	0.0240
59	PCB_81	0.0027	0.0042	0.0169	0.0057	0.0039	0.0037
60	PCB_82	0.4396	0.7737	0.5288	0.4661	0.6616	0.5258
61	PCB_83	0.4040	0.2135	0.2113	0.3293	0.2807	0.4353
62	PCB_84	1.5374	1.2170	1.2260	1.1784	1.1512	1.6087
63	PCB_85_117_116	0.7396	1.3370	1.0446	1.2682	1.3488	1.1189
64	Coplanar1	3.7101	5.3777	3.3524	4.4468	4.2570	4.4265
65	PCB_88_91	1.3707	0.8518	1.0942	1.3668	1.2489	1.4178
66	PCB_89	0.0304	0.0329	0.0558	0.0295	0.0351	0.0352
67	PCB_90_101_113	5.8605	7.2981	5.3750	6.3783	6.2660	6.2725
68	PCB_92	1.6029	1.0196	1.0969	1.5359	1.3954	1.6501
69	Coplanar2	0.3989	0.2455	0.2467	0.3712	0.3455	0.4423
70	PCB_94	0.0975	0.0407	0.0319	0.0717	0.0664	0.1024
71	PCB_95	4.7966	3.1950	4.1132	3.9871	2.6819	4.6180
72	PCB_96	0.0924	0.0214	0.0366	0.0612	0.0335	0.0831
73	PCB_99	3.5365	4.5558	3.2971	5.1807	3.9800	4.6028
74	PCB_103	0.1358	0.0376	0.0521	0.1224	0.0765	0.1365
75	PCB_104	0.0045	0.0017	-0.0001	0.0036	0.0020	0.0041
76	PCB_105	1.3375	3.0789	1.3937	1.5261	2.3657	1.5695
77	PCB_107_124	0.1263	0.3218	0.1632	0.1419	0.2384	0.1480
78	PCB_109	0.2863	0.5070	0.3002	0.5719	0.4961	0.4801
79	PCB_110_115	7.7547	8.8447	7.8150	9.1420	7.6036	8.8674
80	PCB_111	0.0093	0.0036	0.0030	0.0174	0.0051	0.0103
81	PCB_114	0.0731	0.2129	0.0787	0.0874	0.1818	0.1009
82	PCB_118	5.1320	9.5986	3.8875	5.7528	6.4969	4.8130
83	PCB_120	0.0379	0.0112	0.0176	0.0612	0.0231	0.0385
84	PCB_121	0.0045	0.0013	0.0000	0.0068	0.0025	0.0053
85	PCB_122	0.0391	0.0761	0.0479	0.0364	0.0547	0.0477
86	PCB_123	0.1618	0.2434	0.1075	0.1404	0.3169	0.1073
87	PCB_126	0.0113	0.0465	0.0621	0.0198	0.0200	0.0317
88	PCB_127	0.0107	0.0228	0.0097	0.0154	0.0146	0.0053

89	PCB_128_166	0.8935	1.9411	1.3043	1.1102	1.3895	0.9334
90	PCB_129_138_163	5.7753	10.8119	9.2537	7.3597	9.3919	6.3369
91	PCB_130	0.3590	0.6201	0.4347	0.3856	0.5199	0.3667
92	PCB_131	0.0679	0.1508	0.0983	0.0909	0.1241	0.0706
93	PCB_132	1.4783	1.7659	2.2204	1.8888	1.3482	1.0366
94	PCB_133	0.0950	0.1004	0.1164	0.1297	0.1146	0.1076
95	PCB_134_143	0.2865	0.2680	0.2720	0.2278	0.2698	0.2923
96	PCB_135_151	1.4918	1.1560	2.3836	1.6572	1.8327	1.6974
97	PCB_136	0.5691	0.4537	0.6153	0.6126	0.5651	0.6570
98	PCB_137	0.3155	0.6781	0.4165	0.4367	0.6535	0.3935
99	PCB_139_140	0.1116	0.2100	0.1404	0.1667	0.2220	0.1305
100	PCB_141	0.5075	1.0919	1.0645	0.6501	0.9116	0.4773
101	PCB_142	0.0553	0.2779	0.3622	0.2420	0.3185	0.2003
102	PCB_145	0.0020	0.0029	0.0028	0.0028	0.0029	0.0027
103	PCB_146	0.7925	1.0922	1.3484	1.1152	1.1868	0.7960
104	PCB_147_149	3.4651	4.5019	5.9878	3.8785	4.3958	3.5294
105	PCB_148	0.0069	0.0060	0.0075	0.0104	0.0088	0.0097
106	PCB_150	0.0077	0.0066	0.0070	0.0114	0.0085	0.0103
107	PCB_152	0.0067	0.0054	0.0051	0.0075	0.0062	0.0082
108	PCB_153_168	4.1216	6.9443	7.0559	5.6217	6.6045	4.2671
109	PCB_154	0.0600	0.0610	0.0651	0.0797	0.0800	0.0741
110	PCB_155	0.0002	0.0002	0.0000	0.0005	0.0002	0.0003
111	PCB_156_57	0.4975	1.4761	0.6243	0.7228	1.1912	0.5967
112	PCB_158	0.5772	1.1737	0.8296	0.7699	0.9940	0.6285
113	PCB_159	-0.0002	0.0007	0.0388	0.0005	0.0121	0.0008
114	PCB_160	0.0221	0.0404	0.0600	0.0147	0.0329	0.0157
115	PCB_164	0.3157	0.6407	0.5899	0.4061	0.5103	0.3092
116	PCB_165	0.0044	0.0029	0.0023	0.0087	0.0006	0.0023
117	PCB_167	0.1520	0.4656	0.2672	0.2356	0.3328	0.1708
118	PCB_169	0.0010	0.0007	0.0029	0.0012	0.0010	0.0007
119	PCB_170	0.2688	0.7679	0.9906	0.4419	0.6314	0.2906
120	PCB_171_173	0.1751	0.2625	0.4367	0.1977	0.2601	0.1630
121	PCB_172	0.0068	0.1090	0.2450	0.0818	0.1133	0.0497
122	PCB_174	0.3106	0.3259	1.1327	0.2621	0.3770	0.2785
123	PCB_175	0.0208	0.0261	0.0670	0.0239	0.0315	0.0216
124	PCB_176	0.0631	0.0608	0.1875	0.0705	0.0844	0.0643
125	PCB_177	0.2571	0.2841	0.8620	0.2439	0.3395	0.2589
126	PCB_178	0.0964	0.0754	0.3926	0.1091	0.1156	0.1046
127	PCB_179	0.1571	0.1008	0.5494	0.1570	0.1764	0.1614
128	PCB_180_193	0.0179	0.9748	2.4952	0.8817	1.0431	0.4505
129	PCB_181	0.0092	0.0234	0.0176	0.0134	0.0189	0.0111
130	PCB_182	0.0002	0.0056	0.0003	0.0002	-0.0011	-0.0019
131	PCB_183_185	0.3724	0.3949	1.1878	0.4131	0.5167	0.3328

132	PCB_184	0.0005	0.0007	0.0000	0.0007	0.0007	0.0006
133	PCB_186	0.0003	0.0004	0.0020	0.0003	0.0004	0.0003
134	PCB_187	0.6095	0.5240	3.8256	0.8703	1.1478	0.6993
135	PCB_188	0.0006	0.0008	0.0025	0.0008	0.0008	0.0008
136	PCB_189	0.0163	0.0373	0.0382	0.0250	0.0344	0.0163
137	PCB_190	0.0192	0.0797	0.1455	0.0529	0.0770	0.0373
138	PCB_191	0.0012	0.0310	0.0500	0.0218	0.0293	0.0126
139	PCB_192	0.4719	0.0112	-0.0013	-0.0571	-0.0257	0.0619
140	PCB_194	0.0402	0.0702	0.1889	0.0586	0.0780	0.0280
141	PCB_195	0.0242	0.0333	0.1277	0.0351	0.0474	0.0222
142	PCB_196	0.0260	0.0420	0.1828	0.0486	0.0597	0.0286
143	PCB_197_200	0.0139	0.0106	0.0829	0.0178	0.0193	0.0146
144	PCB_198_199	0.0341	0.0663	0.3971	0.0800	0.0946	0.0495
145	PCB_201	0.0154	0.0110	0.0862	0.0163	0.0188	0.0149
146	PCB_202	0.0153	0.0135	0.1154	0.0160	0.0185	0.0166
147	PCB_203	0.0415	0.0654	0.3457	0.0770	0.1021	0.0500
148	PCB_204	0.0001	0.0001	0.0020	0.0001	0.0001	0.0001
149	PCB_205	0.0042	0.0042	0.0194	0.0051	0.0069	0.0036
150	PCB_206	0.0281	0.0259	0.1486	0.0186	0.0263	0.0198
151	PCB_207	0.0035	0.0035	0.0182	0.0026	0.0033	0.0026
152	PCB_208	0.0097	0.0068	0.0562	0.0044	0.0064	0.0064
153	PCB_209	0.0148	0.0059	0.0852	0.0029	0.0055	0.0078

White Sucker Fillet Tissue MIXING PROPORTIONS

	Sample	EM 1	EM 2	EM 3	EM 4	EM 5	EM 6
1	1-WS-5	0.0583	-0.0148	0.7568	0.0776	0.0229	0.0991
2	2-WS-2	-0.0497	0.4128	-0.0016	-0.0202	0.1755	0.4832
3	2-WS-6	0.043	0.6822	0.0436	0.1564	0.0181	0.0567
4	3-WS-3	0.1633	-0.0091	0.0441	0.1304	0.6348	0.0365
5	4-WS-5	0.163	0.0225	0.0398	0.7545	-0.0058	0.0261
6	5-WS-4	0.1642	-0.005	0.0472	0.1565	0.0179	0.6193
7	6-WS-2	0.2989	0.161	0.0274	0.3242	0.1743	0.0141
8	7-WS-2	0.7446	0.0302	0.0367	0.1756	0.0057	0.0072

The software required three iterations for the white sucker fillet PCB congener proportions to achieve the criteria of positive or small negative loadings. Mixing proportions for the white sucker fillet were not as easily interpreted as the clam tissue. Station 2 showed different mixing proportions for the two white sucker samples collected in that area, although in both cases the largest percentage was that of EM 2.

### Composition of the six end members computed for the white sucker carcass tissue follows:

White Sucker Carcass Tissue Compositions of End Members

		Cor	mpositions o	f End Membe	ers		
		EM 1	EM 2	EM 3	EM 4	EM 5	EM 6
1	PCB_1	0.0053	0.0067	0.0022	0.0058	0.0215	0.0105
2	PCB_2	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
3	PCB_3	0.0000	0.0002	0.0000	0.0002	0.0008	0.0003
4	PCB_4	0.3112	0.0739	0.0393	0.1468	0.3755	0.2413
5	PCB_5	0.0008	0.0004	0.0000	0.0005	0.0023	0.0009
6	PCB_6	0.0401	0.0097	0.0103	0.0193	0.0593	0.0328
7	PCB_7	0.0051	0.0016	0.0014	0.0024	0.0083	0.0041
8	PCB_8	0.0785	0.0630	0.0125	0.0281	0.1838	0.0736
9	PCB_9	0.0090	0.0028	0.0017	0.0039	0.0143	0.0068
10	PCB_10	0.0285	0.0049	0.0036	0.0145	0.0331	0.0218
11	PCB_11	0.0003	0.0052	-0.0009	-0.0017	0.0015	0.0012
12	PCB_12_13	0.0103	0.0013	0.0002	0.0054	0.0052	0.0082
13	PCB_14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	PCB_15	0.0036	0.0021	0.0006	0.0041	0.0161	0.0091
15	PCB_16	0.1561	0.0205	0.0625	0.0614	0.1394	0.1114
16	PCB_17	0.9983	0.1606	0.1037	0.4812	0.6109	0.6213
17	PCB_18_30	0.5094	0.0157	0.1445	0.1912	0.3352	0.3698
18	PCB_19	0.5314	0.0899	0.0536	0.2223	0.3934	0.3079
19	PCB_20_28	1.0787	0.2410	0.5579	0.6346	0.9598	0.9437
20	PCB_21_33	0.1055	0.0169	0.0640	0.0428	0.1071	0.0867
21	PCB_22	0.1386	0.0082	0.0884	0.0700	0.1549	0.1263
22	PCB_23	0.0007	0.0001	0.0000	0.0005	0.0006	0.0007
23	PCB_24	0.0001	0.0003	0.0036	-0.0001	0.0002	0.0001
24	PCB_25	0.2315	0.0265	0.0587	0.1067	0.1306	0.2132
25	PCB_26_29	0.8902	0.0019	0.1794	0.3981	0.2661	0.6663
26	PCB_27	1.0915	0.0908	0.0521	0.5186	0.4559	0.8125
27	PCB_31	0.3718	0.0318	0.2037	0.1406	0.3460	0.4110
28	PCB_32	0.7285	0.0942	0.1875	0.3620	0.4839	0.5085
29	PCB_34	0.0141	0.0025	0.0028	0.0082	0.0089	0.0110
30	PCB_35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	PCB_36	0.0188	0.0173	-0.0039	0.1144	0.0173	0.0033
32	PCB_37	0.0254	0.0041	0.0224	0.0175	0.0388	0.0290
33	PCB_38	0.0041	-0.0004	0.0013	0.0035	0.0011	0.0045
34	PCB_39	0.0031	0.0012	0.0030	0.0021	0.0031	0.0028
35	PCB_40_41_71	1.6240	0.3930	0.7071	1.1759	0.8248	1.3181
36	PCB_42	0.8373	0.1904	0.3974	0.5805	0.5522	0.7820
37	PCB_43	0.0679	0.0150	0.0278	0.1323	0.0887	0.1650
38	PCB_44_47_65	5.3451	1.9754	1.6716	3.8813	2.8529	4.6040

39	PCB_45_51	1.2433	0.2056	0.3248	0.6839	0.5581	0.9083
40	PCB_46	0.3445	0.0232	0.0996	0.1525	0.1118	0.2503
41	PCB_48	0.1355	0.0523	0.1204	0.0767	0.1149	0.1159
42	PCB_49_69	5.7598	1.2588	1.3150	4.3065	2.4280	4.3087
43	PCB_50_53	1.8228	0.0940	0.3499	0.9191	0.5158	1.4558
44	PCB_52	4.0318	1.1637	1.3294	1.7658	1.4321	3.0496
45	PCB_54	0.0845	0.0097	0.0050	0.0333	0.0353	0.0501
46	PCB_55	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	PCB_56	0.2346	0.2146	0.2973	0.1633	0.2644	0.2676
48	PCB_57	0.0510	0.0111	0.0148	0.0525	0.0254	0.0492
49	PCB_58	0.0291	0.0059	0.0100	0.0267	0.0102	0.0280
50	PCB_59_62_75	0.4866	0.0276	0.1670	0.3417	0.1447	0.5073
51	PCB_60	0.1217	0.1197	0.1899	0.0997	0.1707	0.1251
52	PCB_61_70_74_76	2.0484	2.8658	1.6950	1.2809	1.9334	2.1212
53	PCB_63	0.0992	0.0604	0.0548	0.0966	0.0962	0.1043
54	PCB_64	1.0024	0.3079	0.6611	0.7310	0.7685	0.9563
55	PCB_66	1.7363	1.4565	1.2267	1.6118	1.6120	1.7977
56	PCB_67	0.0357	0.0070	0.0163	0.0228	0.0244	0.0417
57	PCB_68	0.1667	0.0639	0.0230	0.1812	0.0966	0.1720
58	PCB_72	0.2280	0.0386	0.0406	0.2286	0.0960	0.2287
59	PCB_73	0.0052	0.0187	0.0072	-0.0111	0.0132	0.0067
60	PCB_77	0.0450	0.0200	0.0665	0.0343	0.0502	0.0504
61	PCB_78	-0.0001	0.0001	-0.0001	0.0021	0.0000	0.0008
62	PCB_79	0.0347	0.0579	0.0383	0.0367	0.0428	0.0402
63	PCB_80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
64	PCB_81	0.0036	0.0030	0.0065	0.0038	0.0027	0.0037
65	PCB_82	0.5102	0.6248	0.5089	0.4875	0.6418	0.5726
66	PCB_83	0.3726	0.2120	0.2540	0.3022	0.2631	0.5024
67	PCB_84	1.6051	1.0291	1.1086	1.0403	1.0881	1.6398
68	PCB_85_117_116	1.1397	1.5236	1.1466	1.3694	1.4361	1.3061
69	Coplanar1	4.1898	5.6228	3.3095	4.3238	3.9605	4.5703
70	PCB_88_91	1.3984	0.8459	1.0871	1.3266	1.2342	1.5466
71	PCB_89	0.0349	0.0324	0.0587	0.0262	0.0352	0.0355
72	PCB_90_101_113	5.5308	7.1142	5.5584	5.9843	5.2213	5.6604
73	PCB_92	1.6562	0.9333	1.0999	1.5125	1.3785	1.7534
74	Coplanar2	0.4037	0.2230	0.2388	0.3603	0.3716	0.4582
75	PCB_94	0.0956	0.0333	0.0288	0.0679	0.0691	0.1027
76	PCB_95	5.0526	2.9656	3.8130	3.4664	2.4013	4.6043
77	PCB_96	0.0828	0.0167	0.0325	0.0559	0.0347	0.0770
78	PCB_99	3.8816	4.4515	3.2861	5.0008	3.2712	3.8373
79	PCB_103	0.1301	0.0337	0.0476	0.1228	0.0815	0.1462
80	PCB_104	0.0052	0.0016	-0.0001	0.0041	0.0024	0.0044
81	PCB_105	1.3940	2.7714	1.2832	1.5949	2.2532	1.7265

82	PCB_106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
83	PCB_107_124	0.1475	0.2713	0.1686	0.1674	0.2403	0.1866
84	PCB_109	0.4276	0.5221	0.2963	0.5826	0.5519	0.5437
85	PCB_110_115	7.3792	9.1762	8.5753	8.3686	6.4744	8.3422
86	PCB_111	0.0119	0.0029	0.0040	0.0214	0.0085	0.0156
87	PCB_112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
88	PCB_114	0.0790	0.2179	0.0666	0.1002	0.2089	0.1079
89	PCB_118	4.5220	5.6700	3.6328	5.6686	3.7125	4.2865
90	PCB_120	0.0427	0.0097	0.0172	0.0682	0.0277	0.0459
91	PCB_121	0.0050	0.0014	0.0015	0.0070	0.0027	0.0059
92	PCB_122	0.0387	0.0667	0.0458	0.0403	0.0567	0.0492
93	PCB_123	0.0923	0.1363	0.0833	0.1332	0.2242	0.0878
94	PCB_126	0.0065	0.0059	0.0155	0.0071	0.0259	0.0091
95	PCB_127	0.0078	0.0131	0.0117	0.0128	0.0132	0.0089
96	PCB_128_166	0.9193	1.8687	1.1349	1.3720	1.7024	1.0950
97	PCB_129_138_163	5.0728	10.8948	9.2218	7.8449	10.8433	6.2193
98	PCB_130	0.3652	0.6061	0.4532	0.4999	0.6600	0.4401
99	PCB_131	0.0673	0.1449	0.0991	0.1004	0.1316	0.0891
100	PCB_132	1.5442	2.5392	2.1528	1.6571	0.9211	1.7625
101	PCB_133	0.0934	0.1072	0.1193	0.1555	0.1392	0.1139
102	PCB_134_143	0.2760	0.3315	0.3039	0.3137	0.3306	0.3334
103	PCB_135_151	1.5509	1.3153	2.4943	1.7443	2.0724	1.8016
104	PCB_136	0.5927	0.5619	0.6640	0.6016	0.6094	0.7047
105	PCB_137	0.3817	0.7839	0.4852	0.6282	0.8166	0.4289
106	PCB_139_140	0.1239	0.2096	0.1538	0.1979	0.2590	0.1588
107	PCB_141	0.5079	1.1989	1.2919	0.8099	0.9741	0.6319
108	PCB_142	0.0000	0.0001	0.0013	0.0000	0.0001	0.0001
109	PCB_144	0.1864	0.2865	0.3636	0.2634	0.3666	0.2378
110	PCB_145	0.0022	0.0029	0.0026	0.0025	0.0033	0.0028
111	PCB_146	0.7362	1.1610	1.3530	1.2607	1.4023	0.8585
112	PCB_147_149	3.4264	4.5780	6.5805	4.2610	4.9913	3.9678
113	PCB_148	0.0075	0.0063	0.0071	0.0109	0.0100	0.0098
114	PCB_150	0.0087	0.0080	0.0076	0.0110	0.0099	0.0112
115	PCB_152	0.0073	0.0065	0.0053	0.0078	0.0073	0.0085
116	PCB_153_168	3.6805	7.3302	7.3946	6.0359	7.6554	4.0739
117	PCB_154	0.0637	0.0602	0.0614	0.0920	0.0940	0.0850
118	PCB_155	0.0003	0.0003	0.0000	0.0005	0.0003	0.0004
119	PCB_156_57	0.5011	1.4033	0.6202	0.8255	1.3601	0.6840
120	PCB_158	0.5660	1.1798	0.8187	0.9551	1.1569	0.7336
121	PCB_159	0.0010	0.0012	0.0027	0.0005	0.0044	0.0014
122	PCB_160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
123	PCB_161	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
124	PCB_162	0.0168	0.0289	0.0421	0.0465	0.0355	0.0326

125	PCB_164	0.2631	0.4970	0.5375	0.4348	0.5875	0.3578
126	PCB_165	0.0054	0.0020	0.0032	0.0112	0.0031	0.0067
127	PCB_167	0.1513	0.4373	0.2792	0.2997	0.3989	0.1903
128	PCB_169	0.0008	0.0008	0.0036	0.0006	0.0011	0.0008
129	PCB_170	0.3778	0.9754	1.0992	0.6247	0.9072	0.3980
130	PCB_171_173	0.1633	0.3100	0.4441	0.2703	0.3436	0.1795
131	PCB_172	0.0656	0.1329	0.2629	0.1097	0.1593	0.0633
132	PCB_174	0.2994	0.4135	1.1013	0.3410	0.4770	0.2953
133	PCB_175	0.0200	0.0314	0.0666	0.0294	0.0397	0.0211
134	PCB_176	0.0572	0.0777	0.1824	0.0788	0.1016	0.0646
135	PCB_177	0.2458	0.3476	0.8186	0.3340	0.4400	0.2752
136	PCB_178	0.0969	0.1097	0.3731	0.1229	0.1470	0.1004
137	PCB_179	0.1491	0.1542	0.5401	0.1670	0.2112	0.1564
138	PCB_180_193	0.6529	1.5115	2.7935	0.9244	1.2116	0.5802
139	PCB_181	0.0095	0.0238	0.0164	0.0177	0.0251	0.0119
140	PCB_182	0.0032	0.0063	0.0081	0.0047	0.0067	0.0037
141	PCB_183_185	0.3228	0.5369	1.2243	0.5384	0.6497	0.3473
142	PCB_184	0.0006	0.0008	0.0018	0.0008	0.0010	0.0006
143	PCB_186	0.0003	0.0004	0.0000	0.0004	0.0004	0.0003
144	PCB_187	0.6891	0.8257	3.6676	0.9793	1.4943	0.6680
145	PCB_188	0.0008	0.0009	0.0022	0.0009	0.0011	0.0008
146	PCB_189	0.0146	0.0421	0.0393	0.0311	0.0469	0.0178
147	PCB_190	0.0486	0.1074	0.1927	0.0651	0.0842	0.0451
148	PCB_191	0.0164	0.0370	0.0549	0.0289	0.0415	0.0178
149	PCB_192	0.0001	0.0000	0.0000	0.0001	0.0000	0.0000
150	PCB_194	0.0516	0.1264	0.2759	0.0859	0.1346	0.0490
151	PCB_195	0.0318	0.0592	0.1484	0.0486	0.0727	0.0331
152	PCB_196	0.0454	0.0760	0.1962	0.0584	0.0853	0.0399
153	PCB_197_200	0.0174	0.0196	0.0795	0.0186	0.0261	0.0151
154	PCB_198_199	0.0698	0.1276	0.4226	0.0694	0.1369	0.0626
155	PCB_201	0.0154	0.0182	0.0754	0.0182	0.0251	0.0141
156	PCB_202	0.0186	0.0211	0.1076	0.0165	0.0257	0.0160
157	PCB_203	0.0711	0.1104	0.3571	0.0925	0.1558	0.0656
158	PCB_204	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
159	PCB_205	0.0041	0.0072	0.0193	0.0063	0.0093	0.0037
160	PCB_206	0.0307	0.0341	0.1408	0.0222	0.0377	0.0171
161	PCB_207	0.0039	0.0047	0.0186	0.0030	0.0049	0.0025
162	PCB_208	0.0110	0.0086	0.0497	0.0045	0.0095	0.0048
163	PCB_209	0.0171	0.0064	0.0621	0.0024	0.0079	0.0042

## White Sucker Carcass Tissue MIXING PROPORTIONS

	Sample	EM 1	EM 2	EM 3	EM 4	EM 5	EM 6
1	1-WS-5	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000
2	2-WS-2	0.2085	0.7946	-0.1952	-0.2663	0.3106	0.1478
3	2-WS-6	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000
4	3-WS-3	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
5	4-WS-5	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
6	5-WS-4	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
7	6-WS-2	0.2811	0.3226	-0.0354	0.2361	0.1710	0.0247
8	7-WS-2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PVA results were easier to interpret for the carcass tissue. Individual fingerprints were identified for Stations 1 (1-WS-5; EM 3), 3 (3-WS-3; EM 5), 4 (4-WS-5; EM 4), 5 (5-WS-4; EM 6), and 7 (7-WS-2; EM 1). Samples from Station 2 (2-WS-2, 2-WS-6) did not have the same fingerprints, but in both cases were made up mostly of the EM 2 fingerprint. Station 6, New Market Pond, was a mixture of all but EM 3.

#### 4.1.3.3 Pumpkinseed Fillet and Carcass - PVAs

Although combined pumpkinseed and bluegill data worked well within the framework of a PCA, when PVA was attempted the process did not present a clear picture of distinct fingerprints. Convergence under the specified criteria was also difficult to achieve. Pumpkinseed samples were collected at Stations 1, 2, 3, 4 and 5. Bluegill samples were only collected at Stations 5, 6, and 7, downstream of the CDE Site. Because no bluegill samples were collected adjacent to or upstream from the CDE Site, the pumpkinseed data was modeled using the PVA, in the expectation they would provide a better representation of PCB fingerprints in sunfish along the stretch of the Bound Brook under investigation.

Similar to the white sucker, PVAs for the pumpkinseed fillet and carcass were run in a comparative fashion. Fillet data was modeled and then the carcass data. Results were compared to see if a solution containing the same number of fingerprints would be achieved by both sets of data.

PCA found that a three- to four-component model explained a large part of the variability associated with PCB congener distribution in sunfish fillet tissue and similarly a three-component model for carcass data. PVA was initiated to test for a four end member solution. Computed KMCDs and JCD plots were reviewed. A four end member (fingerprint) solution appeared to be the best model for both the fillet and carcass data providing some consistency in the modeling interpretations.

Compositions of the four end members and the resulting mixture proportions for the pumpkinseed fillet are listed below:

Pumpkinseed Fillet

	Compositions of	End Member	S	
	EM 1	EM 2	EM 3	EM 4
1 PCB_1 2 PCB_2 3 PCB_3 4 PCB_4 5 PCB_5 6 PCB 6	0.0220 0.0002 0.0023 0.2831 0.0009	0.0033 -0.0000 0.0018 0.0407 0.0000 0.0096	0.0108 0.0001 0.0013 0.1470 0.0007 0.0159	0.0163 0.0002 0.0015 0.3135 0.0011 0.0318
7 PCB_7 8 PCB 8	0.0068 0.1192	0.0027 0.0314	0.0038 0.0775	0.0062

9 PCB 9	0.0093	0.0028	0.0052	0.0083
<del>-</del>	0.0305			
10 PCB_10		0.0033	0.0159	0.0247
11 PCB_12_13	0.0074	-0.0000	0.0047	0.0071
12 PCB_15	0.0246	0.0119	0.0187	0.0236
13 PCB 16	0.0317	0.0306	0.0165	0.0396
14 PCB 17	0.4235	0.0967	0.2293	0.4060
15 PCB 18 30	0.2826	0.1371		0.2855
			0.1338	
16 PCB_19	0.1479	0.0271	0.0760	0.1851
17 PCB 20 28	0.7698	0.4843	0.4446	0.6808
18 PCB 21 33	0.0485	0.0468	0.0303	0.0550
19 PCB 22	0.1367	0.1009	0.0795	0.1204
20 PCB 23	0.0006	0.0000	0.0003	0.0005
<del>_</del>				
21 PCB_24	-0.0005	0.0052	0.0000	0.0087
22 PCB_25	0.3043	0.0941	0.1318	0.3015
23 PCB_26_29	0.7062	0.2159	0.2245	0.7331
24 PCB 27	0.2790	0.0205	0.0939	0.2531
25 PCB 31	0.4486	0.2631	0.2459	0.4217
26 PCB 32	0.3976	0.1405	0.1992	0.3911
<del>_</del>				
27 PCB_34	0.0053	-0.0000	0.0024	0.0048
28 PCB_37	0.0528	0.0465	0.0403	0.0410
29 PCB 38	0.0028	0.0000	0.0010	0.0018
30 PCB 39	0.0025	0.0017	0.0017	0.0018
31 PCB 40 41 71	0.6641	0.3570	0.4078	0.6217
32 PCB 42	0.5329	0.2988	0.3378	0.4980
33 PCB 43	0.0002	0.0261	-0.0000	0.0000
<del>_</del>				
34 PCB_44_47_65	3.1008	1.1090	2.0692	2.9802
35 PCB_45_51	0.5003	0.2309	0.3160	0.5080
36 PCB 46	0.0259	0.0183	0.0103	0.0369
37 PCB 48	0.0509	0.0623	0.0432	0.0543
38 PCB 49 69	4.1839	1.1327	2.2821	4.2294
39 PCB 50 53	0.4104	0.1182	0.1647	0.4220
40 PCB_52	6.6106	2.5904	3.7414	6.4787
41 PCB_54	0.0264	0.0032	0.0136	0.0349
42 PCB_55	-0.0006	0.0087	0.0000	0.0104
43 PCB 56	0.2879	0.2930	0.2418	0.2430
44 PCB 57	0.0790	0.0108	0.0285	0.0670
45 PCB 58	0.0343	0.0068	0.0114	0.0250
46 PCB 59 62 75	0.3160	0.1264	0.1077	0.2873
47 PCB_60	0.1167	0.1744	0.1113	0.0955
48 PCB_61_70_74_76	2.3548	1.6009	2.2561	2.2989
49 PCB_63	0.0843	0.0397	0.0617	0.0729
50 PCB 64	0.7271	0.5194	0.4810	0.6529
51 PCB 66	1.7236	1.0150	1.5213	1.5340
52 PCB 67	0.0944	0.0308	0.0440	0.0852
53 PCB 68	0.1449	0.0189	0.0812	0.1414
<del>_</del>		0.0323		
_	0.2073		0.0873	0.2127
55 PCB_77	0.0480	0.0754	0.0359	0.0408
56 PCB_78	0.0033	-0.0000	0.0010	0.0000
57 PCB_79	0.0469	0.0212	0.0557	0.0344
58 PCB 81	0.0041	0.0053	0.0047	0.0028
59 PCB 82	0.3667	0.3334	0.4145	0.3079
60 PCB 83	0.1656	0.0900	0.1414	0.0976
_			0.4222	
61 PCB_84	0.6192	0.5078		0.5331
62 PCB_85_117_116	0.9914	0.7978	1.3986	1.1140
63 Coplanar1	3.7179	2.0885	4.3817	3.4035
64 PCB 88 91	1.0610	0.7976	0.9644	0.9591
65 PCB 89	0.0115	0.0175	0.0085	0.0094
66 PCB 90 101 113	7.0345	4.3076	8.4686	7.4150
67 PCB 92	1.9234	1.0889	1.7652	1.8551
68 Coplanar2	0.2604	0.1276	0.2235	0.2101
69 PCB_94	0.0206	0.0075	0.0123	0.0152
70 PCB_95	4.0205	3.2208	3.3200	3.6793
71 PCB_96	0.0177	0.0119	0.0098	0.0170
72 PCB 99	3.7830	2.2015	4.6363	4.3088
73 PCB 103	0.1135	0.0406	0.0823	0.1059
74 PCB_104	0.0036	0.0000	0.0026	0.0030
	1.3921			
75 PCB_105		0.9951	2.4152	1.6669
76 PCB_107_124	0.2158	0.1588	0.3219	0.2260
77 PCB_109	0.4383	0.2373	0.5746	0.5308
78 PCB_110_115	7.6900	5.9193	7.7921	7.6626
79 PCB_111	0.0084	0.0034	0.0051	0.0120

80	PCB 114	0.0806	0.0479	0.1513	0.0927
81	PCB 118	5.0018	2.7633	7.3339	6.0740
	PCB 120	0.0423	0.0144	0.0228	0.0436
	<del>_</del>				
	PCB_121	0.0039	0.0000	0.0022	0.0040
	PCB_122	0.0518	0.0444	0.0708	0.0494
85	PCB 123	0.1172	0.0650	0.1438	0.0798
86	PCB 126	0.0185	0.0148	0.0293	0.0111
	PCB 127	0.0090	0.0083	0.0167	0.0109
	PCB 128 166	1.0789	1.1683	1.7613	1.1750
	PCB_129_138_163	8.2353	10.8200	11.1056	8.7812
	PCB_130	0.3872	0.4557	0.4958	0.3210
91	PCB_131	0.0536	0.0563	0.0622	0.0354
92	PCB 132	1.4255	1.7867	1.6182	1.1563
93	PCB 133	0.1274	0.1330	0.1350	0.1117
94	PCB 134 143	0.3242	0.3312	0.3339	0.2210
	PCB 135 151	1.9234	3.6125	2.3555	1.5020
	PCB 136	0.4497	0.5925	0.4767	0.3015
	PCB 137	0.5230	0.3650	0.7194	0.4910
	_				
	PCB_139_140	0.1657	0.1391	0.2441	0.1572
	PCB_141	0.8110	1.4026	1.1146	0.7928
100	PCB 144	0.1957	0.3154	0.2880	0.1601
101	PCB 145	0.0017	0.0016	0.0015	0.0008
102	PCB 146	1.3408	1.8230	1.5855	0.0059
	PCB 147 149	5.2641	9.1504	6.5695	4.3949
	PCB 148	0.0084	0.0071	0.0086	0.0070
	PCB 150				
	_ · · _	0.0068	0.0054	0.0064	0.0047
	PCB_152	0.0044	0.0036	0.0042	0.0033
	PCB_153_168	5.2837	7.8551	0.0171	5.8049
108	PCB_154	0.0808	0.0674	0.0941	0.0696
109	PCB 155	0.0004	0.0000	0.0002	0.0003
110	PCB 156 57	0.5953	0.4989	1.0855	0.7515
111	PCB 158	0.6920	0.7667	1.0413	0.7101
	PCB 159	0.0023	0.0022	0.0030	0.0006
	PCB 161	-0.0538	0.0022	0.0036	0.8621
	<del>_</del>				
	PCB_162	0.0154	0.0275	0.0315	0.0169
	PCB_164	0.3870	0.7113	0.5713	0.3804
116	PCB_165	0.0076	0.0041	0.0035	-0.0000
117	PCB 167	0.2097	0.2713	0.3441	0.2829
118	PCB 169	0.0011	0.0055	0.0011	0.0009
119	PCB 170	0.3255	0.8655	0.5849	0.6071
	PCB 171 173	0.1816	0.4860	0.2805	0.2239
	PCB 172	0.0615	0.2739	0.0947	0.0919
	PCB 174	0.3592		0.4949	0.3414
	<del>-</del>		1.6386		
	PCB_175	0.0187	0.0717	0.0256	0.0178
	PCB_176	0.0456	0.1466	0.0595	0.0291
125	PCB_177	0.2606	1.0019	0.3435	0.2401
126	PCB 178	0.1173	0.4650	0.1411	0.0941
127	PCB 179	0.1475	0.6105	0.1862	0.0983
128	PCB 180 193	0.6053	2.1894	0.9207	1.0328
	PCB 181	0.0120	0.0149	0.0203	0.0182
	PCB 182	-0.0002	0.0113	0.0000	0.0049
	PCB 183 185	0.3797	1.3172	0.5221	0.3993
	PCB_184	0.0007	0.0017	0.0009	0.0007
	PCB_186	0.0002	0.0014	0.0003	0.0002
	PCB_187	1.4152	8.5949	1.8377	1.1839
135	PCB_188	0.0008	0.0021	0.0008	0.0008
136	PCB 189	0.0201	0.0424	0.0318	0.0230
137	PCB 190	0.0264	0.0983	0.0447	0.0500
	PCB 191	0.0154	0.0533	0.0258	0.0226
	PCB 192	0.0002	0.0014	0.0001	0.0000
	PCB 194	0.0491	0.2411	0.0704	0.0641
	PCB_195	0.0279	0.1379	0.0396	0.0382
	PCB_196	0.0288	0.1725	0.0389	0.0361
	PCB_197_200	0.0119	0.0711	0.0145	0.0103
	PCB_198_199	0.0726	0.4495	0.0988	0.0985
	PCB_201	0.0138	0.1039	0.0143	0.0108
146	PCB 202	0.0179	0.1379	0.0181	0.0169
	PCB 203	0.0531	0.3178	0.0652	0.0664
	PCB 204	0.0002	0.0014	0.0001	0.0000
149	<del></del>	0.0046	0.0242	0.0058	0.0044
	PCB 206	0.0227	0.1947	0.0226	0.0240
100		0.0221	0.101/	0.0220	0.0240

151 PCB_207 152 PCB_208 153 PCB_209	0.0034 0.0065 0.0094	0.0229 0.0662 0.1354	0.0030 0.0050 0.0048	0.0036 0.0068 0.0106	
	Pumkinseed Fillet MIXING PROPORTIONS				
Sample	EM 1	EM 2	EM 3	EM 4	
1 1-P-2 2 2-P-3 3 3-P-3 4 4-P-3	-0.0019 0.8966 0.0015 0.9456	0.9458 -0.0026 0.0105 0.0084	-0.0581 0.0012 0.9897 0.0601	-0.0020 0.1049 -0.0017 -0.0141	
5 5-P-2	-0.0024	0.0100	0.0596	0.9328	

Mixing proportions show predominantly unique fingerprints at each station. As with the other analyses, Station 2 and Station 3 have different fingerprints, although spatially they are both adjacent to the CDE site, with Station 3 downstream of Station 2.

PVA of the pumpkinseed carcass data was consistent with the fillet data. A four end member solution was chosen based on computed KMCDs and JCD plots.

		Pumkinseed Carcass Compositions of End Members			
		EM 1	EM 2	EM 3	EM 4
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 20 21 22 23	PCB_1 PCB_2 PCB_3 PCB_4 PCB_5 PCB_6 PCB_7 PCB_8 PCB_9 PCB_10 PCB_11 PCB_14 PCB_16 PCB_17 PCB_18_30 PCB_17 PCB_18_30 PCB_19 PCB_20_28 PCB_21_33 PCB_22 PCB_23 PCB_24 PCB_25 PCB_23 PCB_24 PCB_25 PCB_25 PCB_26_29 PCB_27	EM 1  0.0199 0.0002 0.0020 0.2693 0.0010 0.0306 0.0060 0.1115 0.0082 0.0270 0.0073 0.0273 0.0363 0.4258 0.2859 0.1422 0.8314 0.0544 0.1393 0.0005 0.0025 0.3194 0.7050 0.2846	EM 2  0.0020 -0.0000 -0.0000 0.0367 -0.0000 0.0201 0.0019 0.0034 -0.0000 0.0101 0.0252 0.0977 0.1352 0.0246 0.4556 0.0381 0.0914 0.0000 0.0037 0.0964 0.2290 0.0222	EM 3  0.0127 0.0001 0.0014 0.1831 0.0008 0.0172 0.0039 0.0783 0.0052 0.0184 0.0047 0.0227 0.0218 0.2440 0.1474 0.0916 0.4549 0.0333 0.0782 0.0002 0.0047 0.1331 0.2322 0.1021	EM 4  0.0180 0.0002 0.0017 0.3315 0.0011 0.0292 0.0060 0.0919 0.0075 0.0284 0.0382 0.4333 0.2897 0.1757 0.6103 0.0452 0.1058 0.0004 0.0119 0.2824 0.6938 0.2466
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	PCB_31 PCB_32 PCB_32 PCB_34 PCB_35 PCB_36 PCB_38 PCB_39 PCB_40_41_71 PCB_42 PCB_43 PCB_44_47_65 PCB_45_51 PCB_46 PCB_46 PCB_48 PCB_48 PCB_49_69 PCB_50_53	0.4794 0.3799 0.0052 0.0000 0.0561 0.0031 0.0028 0.6207 0.5249 0.0001 3.2985 0.4511 0.0253 0.0648 4.2893 0.3972	0.2508 0.1324 0.0014 -0.0000 0.0465 0.0013 0.0019 0.3797 0.2893 0.0172 1.1329 0.2448 0.0197 0.0645 1.1522 0.1308	0.2519 0.1914 0.0022 0.0004 0.0403 0.0006 0.0016 0.3538 0.3012 -0.0000 2.0971 0.2784 0.0108 0.0419 2.1798 0.1562	0.3772 0.3689 0.0045 0.0008 0.0454 0.0027 0.0022 0.5884 0.4862 0.0000 2.8475 0.5133 0.0348 0.0495 4.0630 0.4250

11	DOD EO	C 1020	0 7000	2 0266	C 2400
	PCB_52	6.1830	2.7238	3.8266	6.2400
42	PCB 54	0.0292	0.0039	0.0167	0.0399
43	PCB 55	0.2773	0.2816	0.2066	0.2362
	_				
44	PCB_57	0.0573	0.0151	0.0212	0.0733
45	PCB 58	0.0208	0.0097	0.0099	0.0208
	PCB 59 62 75	0.3172	0.1119	0.1139	0.2615
47	PCB 60	0.1167	0.1704	0.0979	0.0877
4.8	PCB 61 70 74 76	2.3629	1.4675	1.9344	2.2150
49	PCB_63	0.0824	0.0407	0.0558	0.0716
50	PCB 64	0.7016	0.5267	0.4419	0.6466
	PCB 66	1.6934	0.9671	1.3089	1.4213
	<del></del>				
52	PCB 67	0.0873	0.0332	0.0379	0.0870
53	PCB 68	0.1360	0.0195	0.0715	0.1304
	_				
54	PCB_72	0.1934	0.0344	0.0810	0.1951
55	PCB 73	0.0541	0.0825	0.0395	0.0429
	PCB 78	0.0000	0.0020	-0.0000	0.0000
	<del></del>				
57	PCB 79	0.0501	0.0322	0.0350	0.0438
5.8	PCB 80	0.0036	0.0069	0.0018	0.0026
	_				
59	PCB_82	0.3697	0.3606	0.3872	0.3382
60	PCB 83	0.1332	0.0973	0.0939	0.1601
61	PCB 84	0.6193	0.5338	0.3735	0.5677
62	PCB_85_117_116	1.2147	0.8838	1.4939	1.1966
6.3	Coplanar1	3.9309	2.4123	3.4822	3.6956
	<del>-</del>	1.0896		0.9135	1.0124
	PCB_88_91		0.8455		
65	PCB 89	0.0111	0.0210	0.0076	0.0101
66	PCB 90 101 113	7.1139	4.7845	7.8075	7.3505
67	PCB_92	2.0150	1.2151	1.7080	1.9320
68	Coplanar2	0.2707	0.1531	0.2084	0.1859
	PCB 94	0.0235	0.0089	0.0120	0.0145
70	PCB 95	3.9144	3.3338	2.5595	3.7717
71	PCB 96	0.0189	0.0148	0.0097	0.0194
	_				
	PCB_99	4.6219	2.5790	4.4729	4.7099
73	PCB 103	0.1121	0.0471	0.0780	0.1096
7.1	PCB 104	0.0040	0.0000	0.0028	0.0032
75	PCB_105	1.4977	1.0329	1.9552	1.5346
76	PCB 106	0.2242	0.1729	0.2857	0.2336
	PCB 109	0.4717	0.2467	0.5362	0.4815
	<del></del>				
78	PCB 110 115	7.3276	6.4610	6.5617	7.6480
79	PCB 111	0.0130	0.0039	0.0063	0.0128
	<del></del>				
	PCB_112	0.0922	0.0506	0.1569	0.0908
81	PCB 118	5.2365	3.1825	5.7340	5.2194
82	PCB 120	0.0452	0.0153	0.0261	0.0501
	<del></del>				
83	PCB_121	0.0043	0.0009	0.0023	0.0040
84	PCB 122	0.0507	0.0488	0.0563	0.0459
25	PCB 123	0.1068	0.0801	0.1140	0.1004
	_				
	PCB_126	0.0085	0.0152	0.0086	0.0098
87	PCB 127	0.0099	0.0100	0.0137	0.0113
00	PCB 128 166	1.0108	1.1218	1.6181	1.2626
89	PCB_129_138_163	7.3176	9.7967	10.8782	8.4014
	PCB 130	0.3765	0.4403	0.4934	0.3697
	PCB_131	0.0509	0.0545	0.0529	0.0389
92	PCB 132	1.2504	1.6023	1.2440	1.2316
9.3	PCB 133	0.1166	0.1281	0.1316	0.1263
	PCB 134 143				
		0.3011	0.3133	0.3083	0.2413
95	PCB 135 151	2.0015	3.5939	2.4861	1.8083
96	PCB 136	0.4616	0.5693	0.4871	0.3734
	PCB_137	0.4163	0.3151	0.7076	0.5477
98	PCB 139 140	0.1494	0.1385	0.2233	0.1831
	PCB 141	0.7336	1.1769	1.0900	0.8493
	_				
	PCB_142	0.2080	0.3280	0.2984	0.2029
101	PCB 145	0.0017	0.0018	0.0015	0.0011
	PCB 146			1.4717	
	_	1.1211	1.7725		1.2699
103	PCB_147_149	4.7951	8.0670	6.1088	4.7998
	PCB 148	0.0081	0.0069	0.0089	0.0081
	PCB_150	0.0070	0.0064	0.0067	0.0058
106	PCB 152	0.0049	0.0045	0.0044	0.0037
	PCB 153 168	5.2481	7.5895	7.2153	6.1463
108	PCB_154	0.0817	0.0782	0.0994	0.0857
	PCB 155	0.0003	0.0008	0.0003	0.0003
110	DCB 156 57	U			() '/1 [ ()
	PCB_156_57	0.6346	0.5209	1.0203	0.7152
	PCB_156_57 PCB_158	0.6346 0.6575	0.5209	1.0203	0.7152

112 PCB_159	0.0016	0.0029	0.0020	0.0010
113 PCB_160	0.0189	0.0241	0.0200	0.0243
114 PCB_164	0.3904	0.6503	0.5362	0.3903
115 PCB_165	0.0067	0.0036	0.0039	0.0079
116 PCB_167	0.2125	0.2541	0.3334	0.2558
117 PCB_169	0.0012	0.0067	0.0012	0.0007
118 PCB_170	0.4744	1.0555	0.7594	0.4820
119 PCB_171_173	0.1914	0.4643	0.2943	0.1952
120 PCB_172	0.0844	0.2874	0.1283	0.0788
121 PCB_174	0.3707	1.3266	0.4999	0.2906
122 PCB_175 123 PCB 176	0.0207 0.0486	0.0685 0.1345	0.0287 0.0612	0.0183 0.0321
124 PCB 177	0.2778	0.9084	0.3530	0.2080
124 FCB_177 125 PCB 178	0.1217	0.4552	0.1496	0.2000
126 PCB 179	0.1523	0.5620	0.1882	0.1067
127 PCB 180 193	0.8698	2.8187	1.1766	0.7667
128 PCB 181	0.0133	0.0155	0.0218	0.0162
129 PCB 182	0.0041	0.0000	0.0062	0.0043
130 PCB 183 185	0.3764	1.1738	0.5079	0.3540
131 PCB 184	0.0007	0.0020	0.0009	0.0007
132 PCB 186	0.0002	0.0000	0.0003	0.0002
133 PCB 187	1.5966	8.3291	2.0977	1.1714
134 PCB_188	0.0008	0.0031	0.0009	0.0008
135 PCB_189	0.0226	0.0411	0.0347	0.0216
136 PCB_190	0.0884	0.1789	0.1143	0.0323
137 PCB_191	0.0188	0.0518	0.0303	0.0185
138 PCB_192	0.0001	-0.0000	0.0000	0.0001
139 PCB_194	0.0603	0.2855	0.0808	0.0538
140 PCB_195	0.0368	0.1702	0.0483	0.0323
141 PCB_196 142 PCB 197 200	0.0463	0.2321	0.0584	0.0347
142 PCB_197_200 143 PCB 198 199	0.0149 0.1130	0.0807 0.6853	0.0182 0.1287	0.0101
143 PCB_190_199 144 PCB 201	0.0148	0.0978	0.1267	0.0701
145 PCB 202	0.0184	0.1439	0.0102	0.0159
146 PCB 203	0.0805	0.4513	0.0973	0.0645
147 PCB 204	0.0001	0.0008	0.0001	0.0001
148 PCB 205	0.0047	0.0247	0.0061	0.0041
149 PCB 206	0.0221	0.1726	0.0227	0.0218
150 PCB 207	0.0028	0.0199	0.0028	0.0029
151 PCB 208	0.0059	0.0591	0.0050	0.0060
152 PCB_209	0.0068	0.1056	0.0042	0.0089
	_	1		
		nkinseed Car KING PROPORT		
	MILZ	ING FROFORI	IONS	
Sample	EM 1	EM 2	EM 3	EM 4
1 1-P-2	-0.0000	1.0000	-0.0000	0.0000
2 2-P-3	0.7672	-0.0112	-0.3080	0.5520
3 3-P-3	-0.0000	0.0000	1.0000	-0.0000
4 4-P-3	1.0000	0.0000	0.0000	0.0000
5 5-P-2	-0.0000	0.0000	-0.0000	1.0000

Similar to the pumpkinseed fillet PVA, mixing proportions show unique fingerprints at Stations 1, 3, 4, and 5. Station 2 is a mixture of EM 1 (77%) and EM 4 (55%) presenting a 'messy' picture of its fingerprint. As with the other analyses, Station 2 and Station 3 have different fingerprints, although spatially they are both adjacent to the CDE Site, with Station 3 downstream of Station 2.

# 4.1.4 Comparison of Current (2008) and Historical (1997) Field Investigations Sampling locations for the 1997 study were designated as:

Station A-9	Upstream Bound Brook Reference Area
Station A-1	Station above railroad culvert adjacent to CDE Site landfill
Station A-2	Bound Brook below confluence of Cedar Brook
Station A-3	Bound Brook at Clinton Ave.

Station A-4 Bound Brook above New Market Pond

Stations A-5 & A-6 New Market Pond Station A-10 Spring Lake

A comparison of station designations between the 1997 and the 2008 study:

<u>1997 Study</u>	<u>2008 Study</u>
Station A-9	Station 1 – same location as A-9
Station A-1	Station 2 – adjacent to CDE Site just Downstream of A-1
Not Defined	Station 3 – adjacent to Site
Station A-2	Station 4 – same as A-2
Station A-3	Station 5 – same as A-3
Station A-4	Not included
Stations A-5 & A-6	Station 6 – same as A-5 and A-6
Station A-10	Station 7 – same as A-10

Statistical analyses were conducted to compare data from comparable stations between the 1997 and 2008 studies. In 2008, Station 3 had the highest PCB accumulation in the fish, but this location was not sampled in the 1997 study and therefore was not included in these comparative analyses. Statistical comparisons were conducted using SigmaStat software version 3.0. Statistical comparisons were conducted with alpha=0.05. Data was transformed to approximate a lognormal distribution prior to running the comparisons. Appendix C contains the detailed statistical output for these comparisons.

A statistical comparison of the Aroclor 1254 accumulations in the whole body concentrations of the sunfish (pumpkinseed and bluegill) between the 1997 study and the current study was performed using a two way analysis of variance (ANOVA) followed by Tukey's Multiple Comparison of the Means. A statistically significant difference was found between the 1997 and 2008 Aroclor 1254 concentrations for Station A-2/Station 4. Mean concentrations decreased from 12.18 mg/kg w.w. (n=5) in 1997 to 5.5 mg/kg w.w. (n=4) in 2008.

Additionally, the same statistical methodology was used to compare Aroclor 1248 and Aroclor 1254 accumulations in sunfish and white sucker fillets between the 1997 study and the 2008 study. For sunfish a statistically significant difference was identified for the Aroclor 1248 concentrations between the two years at Station 6 (Stations A5 & A6). Mean concentrations decreased from 0.71 mg/kg w.w. (n=6) in 1997 to 0.24 mg/kg w.w. (n=5) in 2008. However, 1997 sunfish data included only pumpkinseed fillets and the 2008 sampling included only bluegills. It is uncertain how the difference in species affected the overall analyses. For Aroclor 1254, a statistically significant difference was found for all stations per year in sunfish fillets. In all cases (Stations 4, 5 and 6), concentrations of Aroclor 1254 decreased from 1997 to 2008. However, for Station 6 as stated above, 1997 sunfish data included only pumpkinseed fillets and the 2008 sampling included only bluegills, and at Station 4 only two fish were sampled and analyzed for Aroclor 1254 in 1997, making it difficult to assess if a real decrease in concentrations occurred.

For white sucker fillets, Tukey's Multiple Comparison of the Means identified a significant difference in Aroclor 1248 accumulations between years for Stations 5 and 6. For Station 5, Aroclor 1248 decreased from a mean of 2.7 mg/kg w.w. in 1997 (n=3) to a mean of 1.5 in 2008 (n=8) and for Station 6, Aroclor 1248 decreased from a mean of 2.83 mg/kg w.w. in 1997 (n=3) to a mean of 1.04 mg/kg w.w. in 2008 (n=3). A statistically significant difference was found between years for Aroclor 1254 in white sucker fillet tissue for all stations (1, 4, 5, and 6). In all cases, mean Aroclor 1254 concentrations decreased from 1997 to 2008:

Mean Aroclor 1254 (mg/kg w.w.) in Fillet Tissue for White Suckers

	<u>1997</u>	<u>1997</u>
	<u>1998</u>	<u>2008</u>
Station 1	3.22 (n=3)	0.39 (n=8)
Station 4	5.73 (n=3)	2.03 (n=8)
Station 5	6.5 (n=3)	2.37 (n=8)
Station 6	9.03 (n=3)	2.71 (n=3)

#### 4.2 Summary of Statistical Results

Results of the multivariate techniques indicate a spatial trend does exist within the Bound Brook PCB congener data set. This trend was repeated for each of the statistical and graphical techniques implemented and for each matrix evaluated. A distinct change in percent contribution of congeners was noted between Station 1 and Station 2, between Stations 2 and 3, and between Station 3 and the downstream locations. Differences in congener contributions between Station 1 and Stations 2 and 3 were expected, since Station 1 was located upstream of them. Differences in percent contribution for Stations 2 and 3 were unexpected given that Station 2 is located adjacent to the CDE Site, while Station 3 was located only slightly downstream of the CDE Site.

Based upon the interpretation of PCB bar charts the PCBs at Station 7 (Spring Lake) are different from the PCBs at all other stations.

The impact of weathering on PCB congeners in sediment is known to be a complex chemical process influenced by many factors including grain size distribution, temperature fluctuation, currents/storm surges and the presence of other environmental contaminants. This leads to an unknown measure of uncertainty associated with all of the statistical analyses which were performed. Additionally, it is unknown how much the biological processes of the individual biota impact the source identification.

Comparisons of historical and current PCB concentrations found significant differences at some stations. Statistical results varied across the different fish species and tissue types (whole body and fillet). Confounding factors such as small sample sizes and varying species of sunfish complicated the analyses. However, for white sucker fillet tissue a significant difference in Aroclor 1254 accumulation was identified for all stations included in the analyses between the 1997 and 2008 events, with lower mean concentrations in 2008.

#### 4.3 Outstanding Issues Related to the Interpretation of the Congener Data

As noted above, there are a number of issues which may be confounding the interpretation of the PCB congener data. If it is determined that the resolution of these issues is critical to Site decision making; the following suggestions are made for resolving some of these issues:

- Due to the complex nature of the PCB weathering process, a scientist experienced with these processes could examine the PCA and PVA results to see if they can be related to specific PCB patterns.
- The impact of biological processes on PCB fingerprinting may be evaluated to determine if the traditional PVA model can be customized to accommodate these processes.
- The number of congeners included in the analyses may be reduced so that a clearer picture of congener compositions can be obtained.
- A comparison of computed end member compositions to known Aroclor fingerprints may be performed using the cosine theta similarity metric.

- A detailed investigation could be conducted to further examine why PCB fingerprints differ for Station 2 and Station 3 for the Asiatic Clam and fish tissue data and to identify the source of the change.
- Additional sampling could be done within the Cedar Brook drainage to determine if and/or where another PCB source exists.

#### 5.0 FOCUSED ECOLOGICAL RISK ASSESSMENT

#### 5.1 Ecological Risk Assessment Process

This focused ERA will follow steps 3 to 7 of the eight-step process in accordance with the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessment* (EPA 1997).

Steps 3 to 7 are:

Step 3: Problem Formulation;

Step 4: Analysis Plan - Study Design and Data Quality Objectives;

Step 5: Field Verification of Sampling Design;

Step 6: Analysis Phase – Site Investigation and Analysis of Exposure and Effects; and

Step 7: Risk Characterization.

#### 5.2 Problem Formulation

The problem formulation of this focused ERA, incorporating Steps 3 and 4 of the eight-step Superfund process, is a systematic planning process that identifies the factors to be addressed in the ERA (EPA 1997). The components of the Step 3 process include:

- site setting:
- review on the fate and transport of the environmental contaminants, on potential exposure pathways, and on the biota potentially at risk;
- review of the potential ecological effects of the contaminants of concern (PCBs and dioxin-like PCBs) within the Bound Brook ecosystem;
- selection of assessment endpoints; and
- developing a conceptual model with working hypotheses or questions that the site investigation will address.

Step 4, presented in Section 3 of this report, provides the analysis plan and completes the conceptual model begun in Step 3 with the development of the measurable attributes (e.g., measures of effects and measures of exposure) for each of the assessment endpoints.

#### 5.2.1 Site Setting of the Bound Brook

The Bound Brook is a moderately sized perennial stream with headwaters located in the Dismal Swamp, the largest contiguous wetland in Middlesex County. The Dismal Swamp is approximately 650 acres and stretches across the townships of Edison, Metuchen and South Plainfield. The Dismal Swamp is an environmentally sensitive forested wetland that the EPA has designated to be a Federal Priority Wetland. The Dismal Swamp provides natural flood control and is a major aquifer recharge zone. The Dismal swamp supports at least 165 species of birds, along with numerous mammals, amphibians and reptiles and influences the downstream fishery of the Raritan Bay via the Bound and Green Brooks (<a href="https://www.metuchennj.org/Dismal Swamp Guide.pdf">www.metuchennj.org/Dismal Swamp Guide.pdf</a>).

From the Dismal Swamp, the Bound Brook traverses through South Plainfield to New Market Pond (Figure 1). The Bound Brook traverses the southeast corner of the Hamilton Industrial Park property (formerly known as the CDE Site). Stream width varies from 10 to 20 feet across the site, with a varying depth of approximately 1 to 4 feet. The Bound Brook flows northwest for approximately 0.5 miles before joining the Cedar Brook (which drains Spring Lake to the northeast). The Bound Brook flows approximately 0.75 miles before emptying into the east end of New Market Pond. After flowing over a spillway at the west end of New Market Pond, the Bound Brook continues west for approximately four miles before joining with the Green Brook. The Green Brook continues southwest for another three miles before flowing into the Raritan River. All the previously mentioned water bodies are designated by the State of New Jersey for the maintenance, migration, and propagation of the natural and established biota (EPA 1997b). There are approximately 34 acres of wetlands within 0.5 miles of the CDE Site.

Although the USGS gauging stations for the Bound Brook and the Cedar Brook situated in South Plainfield have been discontinued since 1986, peak flow conditions of these streams resulting from even moderate precipitation events tends to rapidly increase the depth and flow conditions of these streams within South Plainfield. The drainage areas of the Bound Brook and the Cedar Brook at South Plainfield have been previously determined by USGS at 9.55 square miles (mi²) and 7.1 mi², respectively (USGS 2005).

As the Bound Brook flows away from Dismal Swamp, large forest fragments and wetland complexes give way to narrowly wooded corridors as it flows toward New Market Pond. Flowing through South Plainfield, the setting for the Bound Brook is largely urban, along with various industrial complexes and railroad operations about the stream corridor. Native habitats adjacent to the brook consist of small woodlots and fields. Woods are dominated by hardwood species, including red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), and various oak (*Quercus*) species. The fields are dominated by tall grasses and brambles (Rosa spp. and Rubus spp.

#### 5.2.2 Environmental Contamination of the Bound Brook

PCB contamination in the Bound Brook was documented in the 1999 ERA report (EPA 1999). This 1999 ERA reported that crayfish, sunfish (pumpkinseed and bluegill sunfish), white suckers, carp and smallmouth bass had effectively bioaccumulated PCBs. PCB concentrations in the Bound Brook sediments were ubiquitous among all sampling locations with relatively high concentrations present downstream of the CDE Site.

In addition, the 1999 ERA report documented that there were a number of other contaminants in the Bound Brook sediments and/or fish tissues including pesticides, low and high molecular weight polycyclic aromatic hydrocarbons (PAHs) and metals that were present at relatively high levels adjacent to and immediately down gradient of the CDE Site. It was documented that concentrations of these contaminants, including PCBs, decreased at sampling locations downstream of New Market Pond, but that there tended to be a sharp increase of contaminants either immediately upstream of New Market Pond or within New Market Pond is most likely the result of a slower rate of flow, resulting in a greater deposition of particles onto which the contaminants are adsorbed. However, the high concentration of contaminants adjacent to and immediately downstream of the CDE Site indicates that it is a primary source of the contaminants within this section of the Bound Brook corridor (EPA 1999). In addition, the proportionally large drainage areas of South Plainfield entering the Bound Brook and the Cedar Brook would also have significant influence on contributing these contaminants from urban runoff along with other industrial/commercial operations within South Plainfield.

Recent sediment sampling performed by EPA Region II indicates that PCB contamination associated with the CDE Site has not declined within the Bound Brook over the past 10 years. A routine monitoring

program conducted by the NJDEP in 2006 reported filet accumulation of total PCBs and dioxin-like PCBs in brown bullhead, American eel, common carp, channel catfish, largemouth bass and lake trout collected from New Market Pond, which is situated approximately 1.25 miles downstream of the CDE Site (NJDEP 2008).

#### 5.2.3 Complete Exposure Pathways

Receptors inhabiting or utilizing the Bound Brook ecosystem may be exposed to PCBs and dioxin-like PCBs through various exposure pathways. Potential complete exposure pathways include direct contact with contaminated media, ingestion of contaminated food items or surface water, incidental ingestion of sediment, dermal contact, and inhalation. Figure 9 provides an overview of the exposure pathways for benthic invertebrates, fish and aquatic feeding birds and mammals.

Benthic invertebrates (e.g., aquatic insects, clams, and crayfish) inhabit the sediment and directly absorb contaminants through dermal contact with sediment particles and interstitial water, as well as through ingestion of contaminated food items and incidental ingestion of sediment. For benthic organisms, the interstitial water phase may represent a substantial portion of the respired fluids. Benthic invertebrates are also exposed to contaminants through direct contact with contaminated surface water, since some of these organisms inhabit surface sediments, filter-feed to obtain food from the overlying water column, and/or construct tubes and burrows through which water is circulated. Additional contact with sediment through ingestion may occur as some benthic invertebrates are deposit-feeders and utilize sediment-associated organic material for food. For this ERA, the accumulation of PCBs and dioxin-like PCBs by benthic invertebrates is evaluated.

Fish may be exposed to contaminants through ingestion of contaminated food and water, incidental ingestion of contaminated sediment, and through direct contact with contaminated sediment and water. The presence of contaminated sediment and surface water not only places fish at risk, but affects them in terms of reproduction and their utilization wetlands as a nursery that are situated upstream and downstream of the CDE Site.

A variety of aquatic feeding mammals (e.g., mink, raccoon, skunk, various bats, small mammals, etc.) inhabits and/or utilizes the Bound Brook ecosystem. Aquatic feeding mammals feed on fish, benthic invertebrates, emerging insects, plants and other vertebrates. The consumption of invertebrates and fish are considered particularly important pathways for PCBs and dioxin-like PCBs. Overall, aquatic feeding mammals may be exposed to contaminants through direct contact with contaminated sediment and water, as well as, being exposed via ingestion of contaminated food items or water, incidental ingestion of contaminated sediment, and inhalation of vapors and particulates.

A variety of aquatic feeding birds (e.g., kingfisher, herons, ducks, hawks, etc.) also inhabits and/or utilizes the Bound Brook ecosystem. Aquatic feeding birds may feed on benthic invertebrates, emerging insects and fish in the surrounding area. The consumption of aquatic invertebrates and fish are considered important pathways for PCBs and dioxin-like PCBs. Avian receptors may be exposed to contaminants through direct contact with contaminated sediment or water, as well as, being exposed through ingestion of contaminated food items or water, incidental ingestion of contaminated sediment, and inhalation.

Dermal contact and inhalation exposure pathways are difficult to evaluate. Exposure through these routes is hard to quantify, and little information is available in the literature on the effects of exposure via these pathways. However, the risk from dermal contact and inhalation can be assumed to be small when compared to ingestion exposure pathways, especially given the tendency of some contaminants to bioaccumulate. Therefore, dermal contact and inhalation will not be evaluated in this risk assessment.

The abiotic exposure pathways from direct contact and/or ingestion of sediment and water are not being assessed in this ERA (See the Uncertainty Section 8). The primary exposure modes being evaluated for this ERA, particularly for the aquatic feeding birds and mammals, are based on the consumption of fish and benthic invertebrates and emerging insects.

#### 5.2.4 Site Ecological Risk Conceptual Model

The site conceptual model is based on contaminant and habitat characteristics and is used to identify critical exposure pathways linking contaminants to receptors. Figure 9 presents an overview of the conceptual site model. PCBs originating from the CDE Site have contaminated the sediments, surface water and interstitial water in the Bound Brook. This contaminated media would be expected to be transported within the Bound Brook from the site area to downstream locations. The PCB contaminants in the sediments, surface water and interstitial water, along with contaminated biota, come in contact with invertebrates and fish residing in the Bound Brook by direct contact and food consumption. The subsequent bioaccumulation of the PCBs by the invertebrates and fish are then consumed by birds and mammals inhabiting and/or utilizing the Bound Brook ecosystem. The bioaccumulation of the PCBs could be expected to decrease the survival, growth and reproduction of the assessment endpoints including the fish, piscivorous birds and mammals, insectivorous birds, invertivorous mammals, and the omnivorous birds and mammals.

For this focused ERA, the exposures from the abiotic media (surface water, sediments and interstitial water) are not being assessed. However, it is understood that these potentially contaminated media present complete exposure pathways. It is understood that risk to the assessment endpoints could be underestimated and is addressed in the Uncertainty Section (Section 8.0). This ERA focuses on the risk related to the consumption of the contaminated biota (fish and invertebrates).

#### 5.2.5 Assessment Endpoints

Assessment endpoints (AEs) are explicit expressions of the actual environmental values (i.e., ecological resources) that are to be protected. Valuable ecological resources include those without which ecosystem function would be significantly impaired, or those providing critical resources (e.g., food, habitat). Appropriate selection of AEs is critical to the utility of an ERA, as it focuses assessment design and analysis. It is not practical or possible to directly evaluate risks to all the individual components of the ecosystem on site, so AEs are used to focus on particular components that could be adversely affected by the contaminants associated with the site.

The following factors need to be considered during the selection of AEs (EPA 1997):

- the fate of the contaminants (PCBs and dioxin-like PCBs) that occur in environmental media and their concentrations;
- the mechanisms of toxicity of PCBs and dioxin-like PCBs to various groups of organisms;
- the receptor groups that are potentially sensitive or highly exposed to the PCBs and dioxin-like PCBs, based on their natural history attributes; and,
- the presence of complete exposure pathways.

A variety of birds, mammals and fish inhabiting and/or utilizing the Bound Brook ecosystem meet the above factors. Therefore, the AEs focused on these groups. The assessment endpoints for this ERA are:

#### 5.2.5.1 Assessment Endpoint #1: Survival, Growth and Reproduction of Fish

The fish community in a stream plays a key role in ecosystem functions such as energy flow, nutrient cycling and organic matter accumulation, and is a food resource for higher trophic level species. Fish present in flowing water ecosystems are adapted for particular habitats through morphological, physiological, or behavioral adaptations. Strong active swimmers such suckers, some minnows, and darters inhabit riffle and other areas of rapid flow. These species seek refuge from the current behind boulders or

are strongly associated with the substrate; they feed by actively encountering drifting macroinvertebrates. The coarse substrate of the riffle areas is a spawning area for these fish species, which bury their eggs in gravel. Pools, overhanging stream banks and other habitats characterized by quiet or less rapid flow support a different fish community that may include sunfish and minnows. These areas also function as post hatching nursery and feeding areas for stream fish. Fish food webs include detritivores, carnivores, herbivores, and omnivores.

The fish community was determined to be of concern due to its role in energy flow, its potential for exposure to contaminants, and its role as a food source for higher trophic level organisms. Therefore, viability and function of the fish community is a valid AE for this ERA.

#### 5.2.5.2 Assessment Endpoint #2. Survival, Growth and Reproduction of Piscivorous Birds

Piscivorous birds rely primarily on fish as forage, and this behavior represents a pathway by which nutrients and energy are transferred from the aquatic to the terrestrial ecosystem. There is a close relationship between terrestrial and aquatic systems due to the flow of energy and nutrients between them. Nutrients enter aquatic ecosystems through surface water runoff, streams, and water infiltration through the soil. Energy enters aquatic ecosystems via sunlight and other biological inputs such as detritus and leaves. Nutrients and energy are transferred from aquatic to terrestrial ecosystems via biological outputs. An example of a biological output is the act of a piscivorous bird consuming fish and/or benthic invertebrates. Nutrient and energy cycles between aquatic and terrestrial systems are delicately balanced. Since nutrients and energy are limiting factors in the production of an ecosystem, the transfer of energy from an aquatic to a terrestrial system and back is essential.

Since piscivorous birds are upper trophic level predators, they are especially susceptible to exposure to contaminants because certain contaminants can bioaccumulate in the organisms upon which they feed. Fish have been shown to accumulate contaminants that are present in aquatic ecosystems. Therefore, birds that consume fish have the potential to accumulate large concentrations of contaminants in their tissues.

# 5.2.5.3 Assessment Endpoint #3. Survival, Growth and Reproduction of Piscivorous Mammals Piscivorous mammals rely primarily on fish as forage. There is a close relationship between terrestrial and aquatic systems due to the flow of nutrients and energy between them. Nutrients enter aquatic ecosystems through surface water runoff, streams, and water infiltration through the soil. Energy enters aquatic ecosystems via sunlight and biological inputs such as detritus and leaves. Nutrients and energy are transferred from aquatic to terrestrial ecosystems via biological outputs. An example of a biological output is the act of a piscivorous mammal consuming fish. Nutrient and energy cycles between aquatic and terrestrial systems are delicately balanced. Since nutrients and energy are limiting factors in the production of an ecosystem, the transfer of energy from an aquatic to a terrestrial system is essential. Piscivorous

mammals provide one mechanism by which the nutrients and energy are transferred and are therefore

important in the maintenance of balanced nutrient and energy cycles.

Since some piscivorous mammals are upper trophic level predators, they are especially susceptible to exposure to contaminants because certain contaminants can bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to biomagnification. Fish have been shown to accumulate contaminants that are present in aquatic ecosystems. Therefore, mammals that consume fish have the potential to accumulate large concentrations of contaminants in their tissues.

Piscivorous mammals play an important role in energy transfer and population regulation. Based on its ecological role and the potential for exposure and adverse effects in a higher trophic level organism, the viability of the piscivorous mammal community was determined to be a valid AE for this ERA.

5.2.5.4 Assessment Endpoint #4. Survival, Growth and Reproduction of Insectivorous Birds Insectivorous birds rely primarily on insects and other invertebrates as forage. The foraging behavior of insectivorous birds represents a pathway by which nutrients and energy are transferred from lower to higher links in the food chain For example; insects are consumed by mid-level insectivores which are in turn consumed by an upper level consumer. Insectivores may also transfer energy from the detrital food chain to the predator food chain in that insectivores may consume detritivores (e.g., millipedes), thereby providing a link between the two chains. Insectivorous birds also consume emerging aquatic insects, and, like piscivorous birds, they are important in energy and nutrient transfer between aquatic and terrestrial systems.

In addition to contributing to terrestrial and aquatic energy pathways, the predation of insects regulates insect population size, species abundance, and diversity. Conversely, insectivorous birds also serve as prey items for upper trophic level predators. Predation by and of insectivorous birds therefore contributes to balanced populations of insects and other aquatic and/or terrestrial organisms. This balance is essential for normal ecosystem functioning.

Since some insectivorous birds are upper trophic level predators, they are especially susceptible to exposure to contaminants because certain contaminants can bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to bioaccumulation. Insects have been shown to accumulate contaminants that are present in terrestrial ecosystems. Therefore, birds that consume insects have the potential to accumulate large concentrations of contaminants in their tissues.

Some birds are resident year-round and some are migratory. The mobility of potential avian receptors, as well as their relatively large home range, variable diet, and often seasonal residency, suggest that the potential for exposure and the identification of specific exposure routes and concentrations are associated with some uncertainty. Nonetheless, the avian insectivorous community is of concern due to its role in energy transfer and regulating populations, and the potential for exposure and adverse effects in a higher trophic level organism. Therefore, viability of the insectivorous avian community was determined to be a valid AE for this ERA.

5.2.5.5 Assessment Endpoint #5. Survival, Growth and Reproduction of Invertivorous Mammals Invertivorous mammals represent two distinct groups that rely on and/or consume benthic invertebrates (e.g., molluscs, crayfish) for forage and those mammals that rely on emerging insects for forage. The foraging behavior of insectivorous and/or invertivorous mammals represents a pathway by which nutrients and energy are transferred from lower to higher links in the food chain. Insectivores also transfer energy from the detrital food chain to the grazing food chain when they consume detritivores (e.g., millipedes).

In addition to contributing to terrestrial and aquatic energy pathways, the predation of insects regulates insect population size, species abundance, and diversity. Conversely, insectivorous mammals also serve as prey items for upper trophic level predators. Predation by and of insectivorous and/or invertivorous mammals therefore contributes to balanced populations of benthic invertebrates and insects and other aquatic and/or terrestrial organisms. This balance is essential for normal ecosystem functioning.

Since invertivorous mammals are mid-level predators, they are exposed to contaminants which can bioaccumulate in the organisms upon which they feed. The higher the trophic level of the food chain, the more concentrated the contaminants in the tissues become due to bioaccumulation or biomagnification. In an aquatic/terrestrial system, certain mammals such as bats are common predators of insects while other mammals are common predators of benthic organisms. Insects and benthic invertebrates have been shown to accumulate contaminants in aquatic ecosystems. Therefore, mammals that consume these invertebrates have the potential to accumulate large concentrations of contaminants in their tissues.

The invertivorous mammal community was determined to be of concern due to its role in energy flow, its potential for exposure to contaminants, and its role as a food source for higher trophic level organisms. Viability and function of the insectivorous small mammal community is a valid AE for this ERA.

#### 5.2.5.6 Assessment Endpoint #6. Survival, Growth and Reproduction of Omnivorous Birds

Omnivorous birds consume plant and animal tissue from several trophic levels. In addition to linking energy pathways in aquatic and terrestrial systems, omnivores foraging on benthic invertebrates, fish, emerging insects, small mammals, and vegetation regulate the population density of these groups. The foraging behavior of omnivorous birds may represent a pathway by which nutrients and energy are transferred from lower to higher links in the food chain. For example, invertebrates are consumed by mid-level omnivores, which are in turn consumed by an upper level consumer. Omnivores may also transfer energy from the detrital food chain to the grazing food chain in that omnivores may consume detritivores (e.g., millipedes), thereby providing a link between the two chains.

Since some omnivorous birds are upper trophic level predators, they are especially susceptible to exposure to contaminants that bioaccumulate in the organisms upon which they feed. Invertebrates, small mammals, and vegetation have been shown to accumulate contaminants that are present in terrestrial ecosystems. Therefore, birds that consume these items have the potential to accumulate large concentrations of contaminants in their tissues.

Some birds are resident year-round and some are migratory. The mobility of potential avian receptors, as well as the relatively large home range, variable diet, and often seasonal residency, suggest that the potential for exposure and the identification of specific exposure routes and concentrations are associated with some uncertainty. Nonetheless, the avian omnivorous community is of particular concern due to its role in energy transfer and population regulation, and the potential for exposure and adverse effects in a mid to higher trophic level organism. Therefore, viability of the omnivorous avian community was determined to be a valid AE for this ERA.

5.2.5.7 Assessment Endpoint #7. Survival, Growth and Reproduction of Omnivorous Mammals Omnivorous mammals consume plant and animal tissue from several trophic levels. In addition to linking energy pathways in aquatic and terrestrial systems, omnivores foraging on insects, benthic invertebrates, fish, small mammals, and vegetation regulate the population density of these groups. Conversely, omnivorous mammals may also serve as prey items for upper trophic level predators.

Based on the role of omnivorous mammals in energy transfer and population regulation, as well as the potential for exposure and adverse effects, the viability of the community was selected as a valid AE for this ERA.

#### 5.2.6 Testable Hypotheses and Measures of Effect

Testable hypotheses are questions about the relationships among AEs and their predicted responses as developed in the conceptual model when exposed to contaminants. The risk questions are based on the AEs and provide the basis for developing the study design (Step 4) and for evaluating the results of the site investigation in the analyses phase (Step 6) and during risk characterization (Step 7).

Measures of effect are the means (measures or measurements) by which the testable hypotheses will be answered. The testable hypotheses and associated measures of effect for each AE are:

Assessment Endpoint #1: Survival, Growth and Reproduction of Fish

Testable Hypothesis: Does the bioaccumulation levels of total PCB and dioxin-like PCBs in the fish affect the survival, growth and reproduction of the fish?

Measures of Effects: Concentrations of total PCBs in the fish tissues in the Bound Brook ecosystem will be compared to literature-based critical body burden TRVs.

Assessment Endpoint #2: Survival, Growth and Reproduction of Piscivorous Birds

Testable Hypothesis: Does modeled doses of PCBs and the dioxin-like PCBs received by birds from the consumption of fish within the Bound Brook ecosystem exceed the TRVs for survival, growth or reproduction of piscivorous birds?

Measures of Effects: The risk from dietary exposure to total PCBs and dioxin-like PCBs from the site-specific fish tissue accumulations from the Bound Brook ecosystem will be determined using food chain models. Ingestion rates calculated using food chain models for piscivorous birds (belted kingfisher, great blue heron and green heron) will be compared to TRVs derived from the literature.

Assessment Endpoint #3: Survival, Growth and Reproduction of Piscivorous Mammals

Testable Hypothesis: Does modeled doses of PCBs and the dioxin-like PCBs received by piscivorous mammals from the consumption of fish within the Bound Brook ecosystem exceed the TRVs for survival, growth or reproduction of piscivorous mammals?

Measures of Effects: The risk from dietary exposure to the PCBs and dioxin-like PCBs from the site-specific fish tissue accumulations from the Bound Brook ecosystem will be determined using food chain models. Ingestion rates calculated using food chain models for piscivorous mammals (mink) will be compared to TRVs derived from the literature.

Assessment Endpoint #4: Survival, Growth and Reproduction of Insectivorous Birds

Testable Hypothesis: Does modeled doses of PCBs and the dioxin-like PCBs received by birds from the consumption of benthic invertebrates within the Bound Brook ecosystem exceed the TRVs for survival, growth or reproduction of insectivorous birds?

Measures of Effects: The risk from dietary exposure to the PCBs and dioxin-like PCBs from the site-specific invertebrate tissue accumulations from the Bound Brook ecosystem will be determined using food chain models. Ingestion rates calculated using food chain models for invertivorous birds will be compared to TRVs derived from the literature.

Assessment Endpoint #5: Survival, Growth and Reproduction of Insectivorous and/or Invertivorous Mammals

Testable Hypothesis: Does modeled doses of PCBs and the dioxin-like PCBs received by mammals from the consumption of benthic invertebrates within the Bound Brook ecosystem exceed the TRVs for survival, growth or reproduction of invertivorous mammals.

Measures of Effects: The risk from dietary exposure to the PCBs and dioxin-like PCBs from the Bound Brook ecosystem will be determined using food chain models. Ingestion rates calculated using food chain models for invertivorous mammals (i.e., raccoon, bats) will be compared to TRVs derived from the literature.

Assessment Endpoint #6: Survival, Growth and Reproduction of Omnivorous Birds

Testable Hypothesis: Does modeled doses of PCBs and the dioxin-like PCBs received by mammals from the consumption of fish and benthic invertebrates within the Bound Brook ecosystem exceed the TRVs for survival, growth or reproduction of omnivorous birds?

Measures of Effects: The risk from dietary exposure to the PCBs and dioxin-like PCBs from the Bound Brook ecosystem will be determined using food chain models. Ingestion rates calculated using food chain models for omnivorous birds (*i.e.*, mallard) will be compared to TRVs derived from the literature.

Assessment Endpoint #7: Survival, Growth and Reproduction of Omnivorous Mammals

Testable Hypothesis: Does modeled doses of PCBs and the dioxin-like PCBs received by mammals from the consumption of fish and benthic invertebrates within the Bound Brook ecosystem exceed the TRVs for survival, growth or reproduction of omnivorous mammals?

Measures of Effects: The risk from dietary exposure to the PCBs and dioxin-like PCBs from the Bound Brook ecosystem will be determined using food chain models. Ingestion rates calculated using food chain models for omnivorous mammals (raccoon) will be compared to TRVs derived from the literature.

## 5.3 Analysis Plan

### 5.3.1 Hazard Quotient Calculations

The Hazard Quotient (HQ) method (Barnthouse *et.al.* 1986, EPA 1997) was employed in this ERA. The HQ method compares exposure concentrations to TRVs or benchmark values based on ecological endpoints such as mortality, reproductive failure, or reduced growth. This is done using chronic toxicity values derived from the literature that are intended to represent a lower dose over a longer duration of exposure, resulting in subtle effects that would be expected to manifest themselves at the population level over the long term. Both the No Observable Adverse Effect Level (NOAEL) and the Lowest Observable Adverse Effect (LOAEL) were used to calculate HQs. The comparison is expressed as a ratio of potential intake values to effect levels, as follows:

# HQ = Exposure Concentration (Maximum or Mean) Effect Level (e.g., NOAEL or LOAEL)

#### 5.3.2 Food Chain Exposure Models

Food chain models were employed for assessing risk to AEs 2 through 7. Two exposure scenarios or models were evaluated for each receptor species. Both exposure models estimated exposure based on food ingestion of fish and/or invertebrates. Sediment and water intake were excluded from these models. The results of these models were used to determine the contamination values that bound the threshold for adverse effects to each AE (EPA 1997). A summary of the two exposure models is as follows:

- Model 1 used conservative life history parameters and either maximum or 95% UCL concentrations of contaminants in the fish and/or invertebrates. Conservative life history parameters included the lowest published adult body weight and the highest published ingestion rates for food. Food exposure was based on the site-specific tissue data derived from either the fish and/or invertebrate (Asiatic clams) tissue analyses.
- Model 2 used representative life history parameters and either mean or maximum concentrations of contaminants in the fish and invertebrates. Representative life history parameters included the mean (or mid-point of a published range) adult body weight, and the mean (or mid-point of a published range) ingestion rates for food. Like Model 1, food exposure

was based on the site-specific tissue data derived from either the fish and/or invertebrate (Asiatic clams) tissue analyses.

The avian and mammalian receptor species selected to model AEs 2 through 7 via food chain exposure models include:

AE #2: kingfisher, green heron, great blue heron

AE #3: mink

AE #4: red-winged blackbird, bank swallow

AE #5: raccoon, little brown bat

AE #6: mallard AE #7: raccoon

Life histories for the selected receptor species are presented in Appendix D. The receptor species identified for AEs 2 to 7 should be viewed as surrogates representative of all species within the feeding guild selected as an AE. For each receptor, a conservative (lowest body weight, highest ingestion rate) and representative (average body weight and ingestion rate) exposure profile has been developed. For this ERA, an area use factor (AUF) of 1.0 was utilized, as the conservative assumption was made that the receptors acquire all of their food at the site.

The primary food items of the receptors were analyzed to measure site-specific PCB exposure. It was assumed that the PCB concentrations in the collected food items were representative of levels in all food items consumed by the receptor.

The effect level values (TRVs) for PCBs and dioxins were based on studies in the published literature. Appendix D provides the toxicological profiles for PCBs and dioxin to receptors and Table 12 lists the TRVs.

Two TRVs were used to evaluate ecological risk, a NOAEL and a LOAEL. The NOAEL is the highest dose at which adverse effects are not expected to occur in a study, and the LOAEL is the lowest dose at which adverse effects are expected to occur. The exposure concentrations derived from the modeling were entered into the HQ equation and a HQ was calculated for both the NOAEL and LOAEL. The following assumptions were made:

- A contaminant concentration was considered to exceed the threshold and demonstrate model-calculated risk to the given receptor if both the NOAEL-based HQ and LOAEL-based HQ were greater than or equal to 1.0.
- If neither the NOAEL- or LOAEL-based HQs were greater than or equal to 1.0, it was concluded that there is no model-calculated risk to the given receptor.
- If the NOAEL-based HQ was greater than or equal to 1.0 but the LOAEL-based HQ was not, it was concluded that it could not be determined that there was no model calculated risk.
- When available, "severe effect/acute effect" TRVs were utilized in the ERA, in addition to the NOAEL and LOAEL TRVs.

#### 5.4 Tissue PCB Concentration Data Evaluation

#### 5.4.1 Fish Tissue: Total PCB and Aroclor Determinations

Tables 1 to 8 list the fish (Carp, white suckers and sunfish (bluegill sunfish and pumpkinseeds)) which were collected for tissue analyses. Each of the eight individual carp collected at both locations was analyzed separately. Each of the white suckers was analyzed individually with the exception of two composite samples at Station 2. All of the pumpkinseed and bluegill sunfish samples were composite samples that incorporated 4 to 5 individuals for each composite.

Three Aroclors (1248, 1254 and 1260) were identified from the fish tissue analyses (Table 1). Both Aroclors 1248 and 1254 were determined in all tissue samples with Aroclor 1254 being at predominately higher concentrations. Aroclor 1260 was identified in most of the fish tissue samples but at much lower concentrations than Aroclors 1248 and 1254.

Total PCB concentrations were determined by enumerating all detectable Aroclor concentrations for both the fillets and carcasses of each fish and/or composite sample. Whole body concentrations for total PCBs of each fish sample were calculated based on the following formula:

Table 1 presents the Aroclor concentrations and total PCB concentrations for each fillet and carcass sample plus the whole body concentrations for total PCBs, Aroclor 1248, Aroclor 1254 and Aroclor 1260. Only the Aroclor concentrations that were analytically determined in each sample were utilized for determining the total PCB concentrations. Any Aroclor concentrations that were reported as undetected (U) were not included in the calculations.

Table 13 provides a descriptive statistics summary of the total PCB whole body concentrations for each type of fish at each station as mg/kg w.w. and as % lipids.

#### 5.4.2 Aroclors and Total PCB Accumulations in Sunfish

Bioaccumulation of Aroclor 1248, Aroclor 1254, and total PCBs within the sunfish (pumpkinseeds and bluegills) depicted a consistent trend between the sampling stations. Station 3 adjacent to the CDE Site and the landfill had the highest concentrations of Aroclor 1248, Aroclor 1254 and total PCBs for the filets (Figure 10), carcasses (Figure 11) and whole body concentrations (Figure 12). Station 2, which is also adjacent to the CDE Site, had lower concentrations of the Aroclors and total PCBs than station 3, indicating that PCB exposure adjacent to the site steadily increases in a downstream direction within this reach. In addition, PCB exposure at Station 2 would be expected to be diluted to some extent as a result of the upstream water with considerably lower PCB contributions. The concentrations of Aroclor 1248, Aroclor 1254, and total PCB bioaccumulation attenuated relative to Station 3 in a downstream direction from Stations 4 and 5 (Area 3) to Station 6 (Area 4, New Market Pond) for the filets, carcasses and whole body concentrations of total PCBs or Aroclors detected followed by Station 7 (Spring Lake) for the sunfish based on filets, carcasses and whole body concentrations (Figures 10 to 12, Table 13).

## 5.4.3 Aroclors and Total PCB Accumulations in White Suckers

Likewise, the bioaccumulation of PCBs in the white suckers depicted a similar trend as the sunfish. Stations 2 and 3 (Area 2 adjacent to the CDE Site) had the highest concentrations of Aroclor 1248, Aroclor 1254 and total PCBs for the filets (Figure 13), carcasses (Figure 14) and whole body concentrations (Figure 15). Lower bioaccumulations of Aroclor 1248, Aroclor 1254 and total PCBs were determined at the downstream stations (i.e. Station 4, 5 and 6) for the filets, carcasses and whole body concentration within the white sucker (Figures 13 to 15). The white suckers at Station 7 (Spring Lake) tended to have lower PCB concentrations than at Station 6 (New Market Pond). Station 1 had the lowest concentrations of PCBs detected with the exception of one white sucker. This one white sucker most likely transported itself from the downstream site area to Station 1.

## 5.4.4 Aroclors and Total PCB Accumulations in Carp

Carp were only collected from Station 6 (New Market Pond) and Station 7 (Spring Lake) with eight carp collected from each station. Figures 16, 17 and 18 present the carp results for the filets, carcasses and whole

body concentrations for the Aroclors and total PCBs. Station 7 had one particular high carp sample (Sample 7-C-4) with a whole body PCB concentration of 55.0 mg/kg (Table 1). The remaining carp samples had total PCB whole body concentrations ranging from 0.77 mg/kg to 13.27 mg/kg at Station 7. In comparison, carp collected from Station 6 had total PCB whole body concentrations ranging from 5.25 mg/kg to 33.7 mg/kg (Tables 1 and 13). Mean whole body concentrations as total PCBs for the carp were 12.88 mg/kg at Station 6 and 11.21 mg/kg at Station 7 (Table 13).

## 5.4.5 Dioxin-like PCBs in Fish Tissues (TEC Concentrations)

Toxicity Equivalence Concentration (TEC) (See Dioxin-like PCBs in Section 2.4) is the concentration of the sum of all of the dioxin-like chemicals present in the environmental media that sums-up the potency relative to 2,3,7,8,-tetrachlorodibenzo-p-dioxin (TCDD). The TEC values are calculated based on exposure estimates to fish, birds and mammals based on Toxicity Equivalency Factors (TEFs). TEFs are factors estimating the relative potency of each dioxin-like chemical to TCDD. TEF values have been determined for each dioxin-like chemical through an international scientific consensus-building process supported by the World Health Organization (Van den Berg *et al.*, 1998, 2006; EPA 2008).

For this ERA, the TEC calculations are based on the sum of the 12 dioxin-like PCB congeners (See Section 2.3.2) analyzed in the fish tissues. The TEC concentrations are calculated providing exposure estimates to fish, birds and mammals based on the concentrations of the dioxin-like PCB congeners determined from the fish tissue. Only the PCB congener concentrations that were analytically determined in each sample were utilized for determining the TEC concentrations. Any PCB congeners that were reported as U were not included in the calculations. The following formula was used for calculating TEC concentrations:

$$TEC = \sum_{n=1}^{\infty} C_n * TEF_n$$
(Fish, Bird, Mammal)  $n=1$ 

where:

 $C_n$  = concentration of each dioxin-like PCB in fish  $TEF_n$  = toxicity equivalency factor for each dioxin-like PCB

Table 14 summarizes the TEC concentrations for fish, mammals and bird as whole body concentrations for each of the fish species analyzed for the PCB congeners at each station. All TEC values are presented as mg/kg w.w. and ng/kg w.w. The TEC concentrations are at the highest levels for birds, followed, by mammals and then fish as a result of the higher toxicity potency of dioxin-like compounds based on the TEF values for each of these respective groups.

The highest TEC concentrations occurred at Stations 2 and 3 adjacent to the CDE Site. For example, the TEC concentrations for fish at Stations 2 and 3 ranged from 3.7 ng/kg for pumpkinseed to 37.6 ng/kg for white sucker. The TEC concentrations at the downstream stations (Stations 4 and 5) and New Market Pond (Station 6) tended to range at a lower level than Stations 2 and 3 with the exception of one carp collected at Station 6. The TEC concentrations at Spring Lake (Station 7) tended to range at lower concentrations than Stations 4, 5, and 6. The lowest TEC concentrations for fish, mammals and bird occurred at the upstream station (Station 1). For example, the TEC concentrations for fish at Station 1 ranged from 0.47 ng/kg for white sucker to 0.54 ng/kg for pumpkinseed (Table 14).

## 5.4.6 Asiatic Clam Tissue: Total PCB and Aroclor Determinations

Three composite samples of Asiatic clams were collected at Station 1, 2, 3, 4, and 5 as discussed in Section 3.5. The clams from each station were composited based on size range that were approximately 1 to 3 years old. Table 15 presents the composite samples, number of individuals in each composite and size range. The tissue determinations of the composite samples were composed of only the soft tissue. All samples were

analyzed for total Aroclor determinations. One composite sample from each station was analyzed for PCB congeners.

Table 15 and Figure 19 provide the bioaccumulation results for Aroclor 1248, Aroclor 1254, Aroclor 1260 and total PCBs for Asiatic clams collected at Station 1 to 5. Station 1 only detected Aroclor 1254 for two of the three clam samples at concentrations of 0.06 to 0.11 mg/kg w.w. Neither Aroclor 1248 nor Aroclor 1260 were detected in any of the clam samples at Station 1. Both Aroclor 1248 and Aroclor 1254 were detected in all clam samples collected at Stations 2, 3, 4 and 5. Aroclor 1254 had bioaccumulated at higher levels ranging from 1.27 mg/kg w.w. to 2.76 mg/kg w.w. between all four stations compared to the bioaccumulation of Aroclor 1248 that ranged from 0.59 mg/kg w.w to 1.16 mg/kg w.w. Aroclor 1260 was only detected in one clam sample (3-AC-3) at Station 3 amongst all samples for all five stations (Table 15, Figure 19).

Statistical summaries of the accumulation of total PCBs (*i.e.*, based on the accumulation of Aroclor determinations) in the Asiatic clams are presented by station in Table 16 and by area in Table 17 as either total PCBs in mg/kg w.w. and % lipids.

## 5.4.7 Dioxin-like PCBs in Asiatic Clams (TEC Concentrations)

The TEC concentrations based on the sum of the 12 dioxin-like PCB congeners analyzed in the Asiatic clams were calculated (Table 18). Since TEF values are not available for invertebrates, TEC concentrations for invertebrates were not calculated. It is noted that the mechanism of toxicity of dioxin-like compounds to invertebrates is expected to be quite different than for fish. The TEC concentrations were calculated for mammals and birds using the assumption that the consumption of contaminated invertebrates by these groups would be similar to the consumption of contaminated fish.

#### 6.0 ERA ANALYSIS PHASE

The analysis phase is part of Step 6 of the eight-step Superfund process (EPA 1997). It is the technical evaluation of existing and potential exposure and ecological effects at the site based on the information collected during Steps 3 through 5. The analysis phase is subdivided into Characterization of Exposure (Section 6.1) and Characterization of Effects (Section 6.2).

#### 6.1 Characterization of Exposure

This ERA characterized exposure based exclusively on the concentrations of total PCBs and dioxin-like PCBs that bioaccumulated within the site-specific fish (sunfish, white suckers and carp) and invertebrates (Asiatic clams) collected from sampling locations on the Bound Brook upstream of the CDE Site (Station 1), adjacent to the CDE Site (Stations 2 and 3), downstream of the CDE Site (Stations 4 and 5), New Market Pond (Station 6) and Spring Lake (Station 7).

# 6.1.1 Total PCB Concentrations by Area with Fish Species Combined

Five sampling areas or reaches are being used for characterizing exposure from consuming fish to Assessment Endpoints 2, 3, 6 and 7. Stations 2 and 3 (Site Area) are combined to incorporate Area 2. Stations 4 and 5 are combined to incorporate Area 3. Areas 1, 4 and 5 are the same as Station 1 (Upstream Reference area), Station 6 (New Market Pond) and Station 7 (Spring Lake), respectively.

Table 19 summarizes the statistics for the whole body PCB concentrations based on combining all fish samples collected (i.e., sunfish, white suckers, and carp). The 95% UCL concentrations and the mean concentrations of the whole body fish tissue for each area were utilized for characterizing exposure in the dietary models.

# 6.1.2 Total PCB Concentrations by Area with Fish Species Combined

The Asiatic clam bioaccumulation results are being used as the invertebrate surrogate species for characterizing exposure from consuming emerging insects and/or benthic invertebrates for the dietary food chain models for Assessment Endpoints 4, 5, 6, and 7.

Statistical summaries of the accumulation of total PCBs (*i.e.*, based on the accumulation of Aroclor determinations) in the Asiatic clams are presented by station in Table 16 and by area in Table 17 as either total PCBs in mg/kg w.w. and % lipids. For the dietary models both the maximum and mean concentrations as mg/kg w.w. by area (i.e. Areas 1, 2, and 3) were used as the exposure concentrations in the dietary models. Area 1 (Station 1 – upstream of the CDE Site) had maximum and mean total PCB accumulations in the clam tissue of 0.112 mg/kg w.w. and 0.087 mg/kg w.w., respectively. Area 2 (Station 2 and 3 – adjacent to the CDE Site) had maximum and mean total PCB accumulations in the clam tissue of 3.76 mg/kg w.w. and 2.67 mg/kg w.w., respectively. Area 3 (Stations 4 and 5 – downstream of the CDE Site) had similar total PCB concentrations in the clam tissue as Area 2 with maximum and mean total PCB accumulations in the clam tissue of 3.41 mg/kg w.w. and 2.65 mg/kg w.w., respectively.

#### 6.2 Characterization of Effects

#### 6.2.1 Fish Tissue Critical Values

Studies that identified adverse effects in fish and tissue concentrations of PCBs at which the adverse effects were observed were compiled (Meador *et al.* 2002). For each study, the lowest tissue concentration of total PCBs associated with a biological response in salmonids was identified. The tissue concentration identified as the 10<sup>th</sup> percentile of the adverse effect concentrations reported in the compiled studies was selected as the residue effect threshold (RET) above which juvenile salmonids would be expected to exhibit adverse sublethal effects from accumulated PCBs. A tissue concentration of 0.14 mg/kg w.w. was identified as an RET protective of salmonids.

Because the studies identified by Meador *et al* (2002) included studies utilizing injection as the route of exposure, and some of the adverse effects identified were not ecologically relevant, the above RET was recalculated using only studies where exposure was via water or diet, and where the observed adverse effects were either on growth or survival. The tissue concentration identified with the 10<sup>th</sup> percentile of the adverse effect level reported in these studies was 0.23 mg/kg w.w.

#### 6.2.2 Food Chain Models

Receptor species from several trophic levels were used for the food chain modeling to characterize exposure to AEs 2 through 7. Organisms which are likely to be exposed to the contaminants (PCBs and dioxin-like PCB congeners) because of specific behaviors, patterns of habitat use, or feeding habits were selected for this evaluation.

Surrogate receptor species were selected for each AE as follows:

AE #2: kingfisher, green heron, great blue heron

AE #3: mink

AE #4: red-winged blackbird, bank swallow

AE #5: raccoon, little brown bat

AE #6: mallard AE #7: raccoon

Appendix D provides the life history and exposure profiles for each of these receptors. The conservative and representative life history parameters used in the models are summarized in Tables 20 and 21.

Table 20 summarizes food chain Models 1 and 2 used to estimate risk from the food consumption. Exposure pathways evaluated in this ERA to AEs 2 to 7 focused exclusively on food consumption of fish and invertebrates. Model 1 used conservative life history parameters (minimum body weight and maximum ingestion rates) and conservative tissue concentrations (*i.e.*, for fish tissue used 95% UCL concentrations of total PCBs and maximum concentrations for TEC and for the invertebrates used maximum concentrations of PCBs and TEC from each of the areas of interest (AOIs)). Model 2 used representative life history parameters (mean or [mid-point of a published range] adult body weight, and the mean [or mid-point of a published range] ingestion rates for food). For the tissue concentrations, Model 2 used the mean concentrations of fish and invertebrates and maximum concentrations of TEC for each AOI.

Dietary models were evaluated for five areas: Area 1 is the same as Station 1 (upstream reference area); Area 2 incorporates Station 2 and 3 (adjacent to the CDE Site); Area 3 incorporates Station 4 and 5 (downstream of the CDE Site); Area 4 is Station 6 (New Market Pond) and Area 5 is Station 7 (Spring Lake).

Two additional models (Models3 and 4) were applied only to AE 3 (Piscivorous Mammals). These models utilize the "severe effect" TRVs which were available for this AE.

#### 7.0 RISK CHARACTERIZATION

Step 7 of the eight-step Superfund process (EPA 1997) focuses on the risk characterization which integrates exposure and effects data for estimating risks to AEs. Each of the following subsections reviews one AE, the testable hypotheses measure of effects used to assess risk, and concludes with a determination of the risk to that AE. This focused ERA excludes abiotic exposure evaluations with the intent of characterizing risk based on the bioaccumulation of PCBs and dioxin-like PCBs through the food web.

# 7.1 Assessment Endpoint #1: Survival, Growth and Reproduction of Fish

The risk to this AE is characterized utilizing the HQ approach and the use of critical body burden (CBB) data. The selection of the PCBs CCB values used in this risk assessment (NOEC = 0.91 mg/kg w.w. and LOEC = 1.44 mg/kg w.w.) is presented in Appendix D. The minimum whole body PCB concentration found in any fish species associated with the CDE Site (other than Station 1 – reference area) was 0.748, which was a bluegill sample from Station 7. Mean concentrations of PCBs in whole body fish tissues at all locations (other than reference area) exceed 1 mg/kg (Table 13). The mean PCB concentrations in the Bound Brook (including New Market Pond) range from approximately 3.5 to 48.09 mg/kg w.w., while in Spring Lake the mean PCB concentrations range from 1.43 to 11.21 mg/kg w.w. In the reference area the NOEC HQ values for the mean whole body concentration do not exceed 1 (maximum mean whole body PCB NOEC HQ value equals 0.7). For all other sampling locations the LOEC HQ equals or exceeds 1. For the Bound Brook locations the LOEC mean whole body PCB concentrations range from 2 to 33. In Spring Lake the LOEC HQ values range from 1 to 8. It is concluded that there is risk from PCBs to AE 1 at all sampling locations other than the reference area.

## 7.2 Assessment Endpoint #2: Survival, Growth and Reproduction of Piscivorous Birds

For this AE, dietary exposures were modeled using the kingfisher, green heron and great blue heron as the receptor species. Two exposure scenarios were used for the models (Table 22). Fish bioaccumulation concentrations of PCBs and dioxin-like PCBs from Areas 1 to 5 were used as the diet for the piscivorous birds. Model 1 used conservative life history parameters along with 95% UCL fish tissue concentrations of PCBs and maximum fish tissue concentrations of dioxin-like PCBs (TEC). Model 2 used representative life history parameters along with mean fish tissue concentrations of PCBs and maximum fish tissue concentrations of dioxin-like PCBs (TEC) (Table 18). Appendix E provides the food chain models.

Table 22 summarizes the HQs based on Models 1 and 2. Piscivorous birds are at risk from dietary exposures of total PCBs in fish collected from Areas 2, 3, 4 and 5 (Table 22) based on conservative (Model 1) and representative (Model 2) models. Likewise, piscivorous birds are at risk from dietary exposures of dioxin-like PCBs in fish collected at Areas 2, 3, 4, and 5 based on Model 1. Model 2 also indicated that piscivorous birds are at risk from dietary exposures of dioxin-like PCBs in fish collected at Areas 2, 3, and 4. At Area 5 (Spring Lake), it could not be concluded that risk exists from dietary exposures of dioxin-like PCBs in fish (Table 22).

Area 1 (the upstream reference area) indicated that it could not be concluded that there is no model-calculated risk to piscivorous birds from dietary exposures of total PCBs and dioxin-like PCBs. It should be noted that the HQs at Area 1 were one to two orders of magnitude lower than Areas 2, 3, 4 or 5 for both total PCBs and dioxin-like PCBs. The highest HQs for all three receptors occurred at Area 2 adjacent to the CDE Site for both total PCBs and dioxin-like PCBs for both Models 1 and 2 (Table 22).

7.3 Assessment Endpoint #3: Survival, Growth and Reproduction of Piscivorous Mammals For this AE, dietary exposures were modeled using mink as the receptor species. Two exposure scenarios were used for the models (Table 20). Fish bioaccumulation concentrations of PCBs and dioxin-like PCBs from Areas 1 to 5 were used as the diet for the piscivorous mammals. Model 1 used conservative life history parameters along with 95% UCL fish tissue concentrations of PCBs and maximum fish tissue concentrations of dioxin-like PCBs (TEC). Model 2 used representative life history parameters along with mean fish tissue concentrations of PCBs and maximum fish tissue concentrations of dioxin-like PCBs (TEC) (Table 20). Appendix E provides the food chain models.

Table 23 summarizes the HQs based on Models 1 and 2. Piscivorous mammals are at risk from dietary exposures of total PCBs in fish collected from Areas 1, 2, 3, 4 and 5 based on conservative Model 1 and representative Model 2. The HQs for total PCBs at Areas 2, 3, 4, and 5 were one to two orders higher than Area 1 for both Models 1 and 2.

Piscivorous mammals are at risk from dietary exposures of dioxin-like PCBs in fish collected from Areas 2 and 4 based on Model 1. However, it could not be concluded that there is no model-calculated risk exposure of dioxin-like PCBs in fish at Areas 3 and 5 based on Model 1. The more representative model (Model 2) indicated that it could not be concluded that there is no model-calculated risk exposure of dioxin-like PCBs at Areas 2 and 4 (Table 23).

The HQs for the upstream Area 1 indicates that there is no model-calculated risk to the piscivorous mammals from dioxin-like PCBs in fish in this reference area based on Models 1 and 2.

Models 3 and 4 evaluated risk based on acute toxicity TRVs. Model 3 used the same conservative parameters and tissue concentrations as Model 1 and Model 4 used the same representative parameters and tissue concentrations as Model 2. The HQs for Model 1 is calculated based on a low acute TRV value and Model 2 is based on a higher acute TRV value.

Piscivorous mammals are at risk to acute toxicity from dietary exposures of total PCBs in fish collected from Area 2 based on conservative (Model 3) and representative (Model 4) models (Table 23).

Areas 3, 4 and 5 indicated that risk for acute toxicity exists from dietary exposures of total PCBs in fish collected in these areas based on conservative Model 3 at both the low and high acute TRVs. However, Model 4 only indicated risk for acute toxicity based on the low acute TRV and not the high acute TRV.

The HQs for the upstream Area 1 indicates that acute toxicity to the piscivorous mammals does not exist from exposure to total PCBs for Models 3 and 4 (Table 23).

7.4 Assessment Endpoint #4: Survival, Growth and Reproduction of Insectivorous Birds

For this AE, dietary exposures were modeled using red-winged blackbird and the bank swallow as the receptor species. Two exposure scenarios were used for the models (Table 20). The food intake was based on the invertebrate (Asiatic clam) tissue concentrations collected at Areas 1, 2 and 3. The Asiatic clam tissue data is used as a surrogate food source instead of aquatic insects that would be the preferred food source. Appendix E provides the food chain models.

Table 24 summarizes the HQs based on Models 1 and 2. Insectivorous birds are at risk from dietary exposures of total PCBs in invertebrate tissue collected from Areas 2 and 3 based on conservative Model 1 and representative Model 2. It could not be concluded that there is no model-calculated risk exposure of dioxin-like PCBs in invertebrates at Areas 2 and 3 based on Models 1 and 2.

The upstream reference area did not indicate any risk to the insectivorous birds from total PCBs or dioxin like PCBs for either Models 1 and 2 (Table 24).

7.5 Assessment Endpoint #5: Survival, Growth and Reproduction of Invertivorous and/or Insectivorous Mammals

For this AE, dietary exposures were modeled using the raccoon and the little brown bat as the receptor species. Two exposure scenarios were used for the models (Table 20). The food intake was based on the invertebrate (Asiatic clam) tissue concentrations collected at Areas 1, 2 and 3. The Asiatic clam tissue data is used as a surrogate food source instead of aquatic insects that would be the preferred food source for the little brown bat. The raccoon would be expected to consume mollusks like the Asiatic clams collected from the Bound Brook. Appendix E provides the food chain models.

Table 25 summarizes the HQs based on Models 1 and 2. Invertivorous and/or insectivorous mammals are at risk from dietary exposures of total PCBs in invertebrate tissue collected from Areas 2 and 3 based on conservative Model 1 and representative Model 2. There is no model-calculated risk from dietary exposure of total PCBs in invertebrates at Area 1 based on Models 1 and 2.

There is no model-calculated risk from exposure of dioxin-like PCBs in invertebrates at Areas 1, 2 and 3 based on Models 1 and 2 (Table 25).

7.6 Assessment Endpoint #6: Survival, Growth and Reproduction of Omnivorous Birds For this AE, dietary exposures were modeled using the mallard as the receptor species. Two exposure scenarios were used for the models (Table 20). The food intake was based on the fish and invertebrate (Asiatic clam) tissue concentrations collected at Areas 1, 2 and 3. Appendix E provides the food chain models.

Table 26 summarizes the HQs based on Models 1 and 2. Omnivorous birds are at risk from dietary exposures of total PCBs in fish plus invertebrate tissue collected from Areas 2 and 3 based on conservative Model 1 and representative Model 2.

Omnivorous birds are also at risk from dietary exposures of dioxin-like PCBs in fish plus invertebrate tissue collected from Area 2 based on conservative Model 1. However, the more representative model (Model 2) indicated that it could not be concluded that there is no model-calculated risk exposure of dioxin-like PCBs at Areas 2 (Table 26).

For the upstream reference area it could not be concluded that there is no model-calculated risk from total PCBs based on Model 1. There was no risk based on Model 2 for total PCBs. In addition, the upstream

reference area did not indicate any risk to the omnivorous birds from dioxin-like PCBs for either Models 1 and 2 (Table 26).

7.7 Assessment Endpoint #7: Survival, Growth and Reproduction of Omnivorous Mammals

For this AE, dietary exposures were modeled using the raccoon as the receptor species. Two exposure scenarios were used for the models (Table 20). The food intake was based on the fish and invertebrate (Asiatic clam) tissue concentrations collected at Areas 1, 2 and 3. Appendix E provides the food chain models.

Table 27 summarizes the HQs based on Models 1 and 2. Like the omnivorous birds, the omnivorous mammals are at risk from dietary exposures of total PCBs in fish plus invertebrate tissue collected from Areas 2 and 3 based on conservative Model 1 and the more representative Model 2.

It could not be concluded that there was no model-calculated risk from dioxin-like PCBs at Area 2 based on Model 1.

The upstream reference area and Area 3 did not indicate any risk to the omnivorous mammals from dioxin-like PCBs for either Models 1 and 2 (Table 27).

#### 8.0 UNCERTAINTY ANALYSIS AND ASSUMPTIONS

Uncertainties and limitations are inherent in all risk assessments and need to be considered when interpreting results. Knowledge of the sources of uncertainty, how the ERA dealt with the sources of uncertainty, and an understanding on the magnitude of the effects resulting from the sources of uncertainty allows for informed management decisions. The nature and magnitude of uncertainties depend on the amount and quality of data available, the degree of knowledge concerning the site conditions, and the assumptions made to perform the assessment. Within this ERA, decisions regarding the direction of uncertainty were made to err towards the conservative side; however, there are some instances for which insufficient information was available to estimate the direction of the uncertainty. The uncertainties related to problem formulation, exposure characterization, effects characterization, and risk characterization are discussed in the following sections.

#### 8.1 Uncertain Within the Problem Formulation

There are several sources of uncertainty within the problem formulation phase of the ERA. These include: issues related to use of existing data; the selection of AEs; and assumptions within the conceptual model.

In this discussion the uncertainty associated with the data is not related to the analytical data itself, but rather whether or not the data is appropriate to the evaluations utilizing the data. For example, is the mean value reported an accurate expression of the real mean value. In this study the issue is whether or not the data is representative of the field conditions such that the data can be compared temporally and whether or not the use of the data as estimates of dietary exposure is representative of actual exposures. With regards to temporal considerations, the data generated is of comparable quantity and quality to allow these statistical evaluations. With respect to the use of the data for exposure estimation, the approach taken should not underestimate the actual exposure.

The selection of appropriate AEs and the receptors that will serve to characterize risk is a critical step within the problem formulation of an ERA. If a particular AE that may be exposed to site contaminants is overlooked or not identified, there could be an underestimation of risk. This investigation utilized a focused ERA and is not intended to replace the baseline ERA (BERA). The AEs selected are those which are believed to include the most sensitive environmental receptors to PCBs which could occur within the area of the CDE Site.

The site conceptual model presents the pathways by which contaminants are released from source areas and receptors are exposed. This ERA focused exclusively on the consumption of fish and/or invertebrates as the exposure pathway to be evaluated. Exposure pathways related to abiotic media including surface water and sediments was not evaluated in this ERA. While this approach may underestimate the exposure, particularly for some species, the receptor models utilized an evaluation of the exposure potential, suggesting that the underestimation of exposure is unlikely to be substantive within the calculations. In addition, some exposure pathways are difficult to evaluate or information does not exist to allow for a quantitative evaluation of exposure from particular exposure pathways. Within this ERA, dermal and inhalation exposure pathways were not addressed. It is believed that these exposure pathways are also not substantive relative to other exposure pathways (e.g., food ingestion).

## 8.2 Characterization of Exposure

The uncertainties associated with exposure characterization include: the total exposure estimations; exposure pathways not retained for quantitative evaluation; identification of ecological receptors; selection of representative species; and exposure route assumptions.

Total exposure of PCBs was based on the maximum and mean concentrations that were derived from each sampling location and the overall site. These total exposure concentrations, particularly the maximum concentrations, would be expected to overestimate risk.

Within this ERA, the selection of receptor model species was done with the intent of selecting a species expected to be at the high end (most exposed) of the exposure distribution for the group of organisms represented by the AE. The uncertainty associated with the selection of species models is often in the direction of over estimation of exposure. However, it is possible that a species or individual organism could have higher exposures than those calculated within this ERA.

Life history data for the avian and mammalian receptors were based primarily on literature-derived data for species known to inhabit or utilize the region of this study area. However, the exposure parameters were either based on data from the same species from different areas or modeled based on allometric relationships (e.g., food ingestion rates). Uncertainty is introduced from the use of literature-based values for food ingestion rates, dietary compositions and body weights. Another assumption is that the contaminants in food items were assumed to exhibit 100% absorption efficiency and were assumed not to be excreted during the life of the receptor. That is, the risk estimated from dietary exposure is based on administered dose not adsorbed dose, this assumption likely overestimates actual exposure and hence the risk.

Certain assumptions were made relating to several exposure parameters that deviated from the information developed within the life history profiles. For the AUF, which is the foraging area utilized by the receptor for the exposure model, a factor of 1.0 was applied. An AUF of 1.0 assumes that 100% of the exposure occurs at the exposure point concentration. For these high-end exposure scenarios, the exposure value for each contaminant used in the risk calculations was assumed to be present throughout the foraging area of the receptor and encountered at the predicted concentration and does not incorporate the seasonal movement patterns of some species. The AUF of 1.0 being applied should typically overestimate the actual risk to most of the receptors. However, it is known that wildlife use the environment unevenly. Wildlife forages where food or other resources are plentiful and/or easily obtained. This preferential use of habitat can reasonably result in effectively an AUF of 1 for periods of time. These time frames can be comparable to the exposure periods from which the toxicity data has been generated.

The food chain models used simplified diets of typically one item with a static ingestion rate. In reality, each receptor organism's diet is varied, and the ingestion rate varies with food availability and metabolic needs (such as during growth of young and periods of metabolic stress). While reliance on a single forage

item is not realistic over long time periods or even a growing season, it may not be implausible within the time frame relevant to the toxic mechanism of the contaminants. As discussed above, organisms do not use the environment uniformly, but rather forage where food is most readily available to them. Also, organisms may focus on particular food items as they become available, such as when insects are emerging or when a particular berry is ripe. For this reason, the use of a single food item was selected such that the potential for under-estimating exposures is believed to be low.

#### 8.3 Characterization of Effects

Benchmark values were derived from the most current criteria, guidance, or technical data available and were based on the more conservative value of the available published literature that would not pose an adverse effect.

Not all TRVs for the birds and mammals (Appendix D) represent the same degree of certainty. Toxicity reference values were mostly derived from laboratory animal studies. The extrapolation between species from different taxa may induce error because of differences in pharmacokinetics, representative organs, and population variability. Toxicity reference values were selected through a systematic process to minimize the potential for under-estimating the toxicity of contaminants to the assessment endpoints. A literature search was conducted to determine the chronic toxicity of the contaminants of concern when ingested by the indicator species. If no toxicity values could be located for the receptor species, values reported for a closely related species were used. All studies were critically reviewed to determine whether study design and methods were appropriate. When values for chronic toxicity were not available, LD<sub>50</sub> (median lethal dose) values were used. For the purposes of this ERA, a factor of 10 was used to convert the reported LD<sub>50</sub> to a LOAEL. A factor of 10 was also used to convert a reported LOAEL to a NOAEL. When several toxicity values were reported for a receptor species, the most conservative value that resulted in an ecologically significant adverse effect was used in the risk calculations, regardless of toxic mechanism. Toxicity values obtained from long-term feeding studies were used in preference to those obtained from single-dose oral studies. No other safety factors were incorporated into this ERA.

Uncertainty is related to estimates of effects (e.g., NOAELs, LOAELs, LD<sub>50</sub>s) that have inherent variability. These values are statistically determined and are reflective of the experimental design. For example, within a particular toxicity study, the reported LOAEL and/or NOAEL are dependent upon the exposure levels selected within the study design. It is not known within these studies how much lower the LOAEL may be or how much higher the NOAEL may be. However, within the risk calculations, this error is believed to be relatively minor as compared to other sources of error within the risk calculations of the ERA.

In some cases, contaminant doses in the diet were reported as parts per million (ppm). These were converted to a daily intake in milligrams per kilogram body weight BW per day (mg/kg BW/day). This conversion allows dietary toxicity levels cited for one species to be converted to a daily dose for a different species based on body weight.

Error can be introduced by use of invalid assumptions in the conceptual model. Conservative assumptions were made in light of the uncertainty associated with the risk assessment process. This was done to minimize the possibility of concluding that no risk is present when a threat actually does exist (i.e., to eliminate false negatives). Whenever possible, risk calculations were based on conservative values.

#### 8.4 Risk Characterization

This ERA evaluates exposure to contaminants through food ingestion and critical body burden. Major sources of uncertainty include natural variability, error, and insufficient knowledge. Natural variability is an inherent characteristic of ecological receptors, their stressors, and their combined behavior in the environment. Biotic and abiotic parameters in these systems may vary to such a degree that the exposure of similar ecological receptors in the same system may differ temporally and spatially. Factors that contribute

to temporal and spatial variability include differences in individual organism behavior (within a species), changes in the weather or ambient temperature, unanticipated interference from other stressors, interactions with other species in the community, differences between microenvironments, and numerous other factors.

Risk to AE 2 and 4 was evaluated from food chain modeling that incorporated exposure to contaminants through food chain models were run. Model 2 was the most conservative of the models and would be expected to overestimate risk for these AEs. Model 3 was the least conservative model and could possibly be expected to underestimate risk for these AEs.

The selection of representative receptor species for the avian and mammalian AEs for characterizing risks was based on the availability of species-specific exposure parameters. Other species present may have different exposure or intake parameters than that modeled for the receptor species, which could result in a lower exposure estimate and or a particular species may be more toxicologically sensitive to the site contamination.

#### 9.0 SUMMARY OF RESULTS AND CONCLUSIONS

The objectives of this investigation were to:

- 1. Re-establish the baseline concentrations of PCBs and dioxin-like PCBs in fish and invertebrate tissue within the Bound Brook for remedy effectiveness monitoring;
- 2. determine the total PCB, PCB congeners and dioxin-like PCBs concentrations in selected fish (sunfish and carp) and invertebrates (Asiatic clams), and compare with historical data from the Bound Brook;
- 3. provide a fingerprint of the PCB congeners within the Bound Brook extending from the CDE Site to the New Market Pond;
- 4. define the ecological receptors that actually exist in the Bound Brook system; and
- 5. provide a focused ERA to evaluate the current PCB risks to selected assessment endpoints and provide data for and support to Baseline ERA being conducted in the RI/FS.

Fish were collected along the Bound Brook system matching sampling locations and species to the extent it was practical in meeting all of this investigation's data quality objectives (DQOs). The data generated does provide a basis for comparisons of current fish PCB concentrations to historical data and will be valuable for comparison with future data sets that may be generated. For future sampling efforts, it may not be necessary to collect all of the sample species or utilize all of the sampling locations. The specific DQOs of future evaluations will determine which species and or sampling locations are required. For example, for time trend evaluations the use of a single species may be sufficient at three locations and fish consumption advisory data may be generated utilizing established compositing protocols.

Comparisons of historical and current PCB concentrations found significant differences at some stations. Statistical results varied across the different fish species and tissue types (whole body and fillet). Confounding factors such as small sample sizes and varying species of sunfish complicated the analyses. However, for white sucker fillet tissue a significant difference in Aroclor 1254 accumulation was identified for all stations included in the analyses between the 1997 and 2008 events, with lower mean concentrations in 2008. These findings suggest that the loading of PCBs into the Bound Brook have declined over the last 10 years.

The results of evaluations on PCB congener data through graphical representations as well as the PCA and PVA analyses results in several findings. While all sampling locations generated PCB data identified as Aroclor 1254, Aroclor 1248 and most contained Aroclor 1260; the data suggests that the origins and/or other fate and transport factors are not the same. Results of the multivariate techniques indicate a spatial

trend does exist within the Bound Brook PCB congener data set. This trend was repeated for each of the statistical and graphical techniques implemented and for each matrix evaluated. A distinct change in percent contribution of congeners was noted between Station 1 and Station 2, between Stations 2 and 3, and between Station 3 and the downstream locations. Differences in congener contributions between Station 1, and Stations 2 and 3, were expected since Station 1 was located upstream of them. Differences in percent contribution for Stations 2 and 3 were unexpected given that Station 2 is located adjacent to the CDE Site, while Station 3 was located only slightly downstream of the CDE Site. Sampling stations downstream of the confluence of the Cedar Brook and the Bound Brook contain congener patterns which are not dissimilar from each other. It is concluded that Station 7, Spring Lake, on the Cedar Brook also has a unique congener pattern.

The findings above support the following conclusions:

- 1. The reference area utilized in this study is outside of the direct influence of the CDE Site.
- 2. Station 2 appears to contain a unique PCB congener pattern, representative of the CDE Site.
- 3. Station 3 has a unique PCB pattern which is the result of either an additional PCB contributing source to the Bound Brook. It is possible that the unique PCB congener pattern is a result of chemical fate and transport properties of the Bound Brook system, however, the close proximity of the two locations (station 2 and 3) support the concept of another source of PCBs. The data do not support conclusions regarding the relative strength of PCB sources (mass release rates). Additional efforts in interpretation of the existing data, such as evaluation of the congener patterns relative to degradation potential, may assist in distinguishing between the likelihood that the differences in congener patterns are a result of chemical fate and transport issues or an additional PCB source.
- 4. The unique PCB congener pattern found in Spring Lake supports a conclusion that another PCB source, other than the CDE Site, exists in the Cedar Brook.

A wildlife survey conducted as part of this investigation conclusively determined a mink population exists and utilizes the Bound Brook system, as well as other wildlife. Of interest was the identification of the presence of a fisher (*Martes pennanti*) in the study area during the wildlife survey. The survey suggested that while the mink population is likely centered upstream of the Site, wildlife are venturing into the Site (presumably to forage for food), as evidenced by the high track density at the Site. Given the large foraging area of mink, up to several miles of stream, it is plausible that mink do forage within the Site boundary.

The reassessment of ecological risk estimates supports the conclusion that substantive ecological risk does exist to fish and wildlife within the Bound Brook resulting from the CDE Site. It is concluded that ecological risk does exist from PCB exposure for all assessment endpoints evaluated in the ERA. This risk exists at the CDE Site and all downstream locations. Risk also exists in/from exposures in Spring Lake. Of particular concern is the risk to fish consuming mammals, such as mink, which are documented to be utilizing the study area. The CDE Site related exposure to PCBs for these receptors may exceed SELs, which may result in overt impacts to these animals.

#### 10.0 LITERATURE

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Table 1. Aroclor and Total PCB Accumulation in Fish Filets, Carcasses and Whole Body Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

							F	ish Filets (mg,	/kg wet weig	ht)			Fish	Carcasses (m	ng/kg wet we	eight)			Whol	e Body Con	centrations	;		
		Sample Location	Length (mm)	# of Fish/ Sample	Mass (g)	Fillet Weight (g)	Carcass Weight (g)	% Solids	% Lipids	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	% Solids	% Lipids	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	Total PCBs	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs % Lipids
		1-WS-1	151	1	36.7	3.02	28.33	21	0.50	0.757	2.150	0.297	3.210	23.5	1.5	3.970	11.80	1.750	17.50	16.12	3.66	10.87	1.61	1116
	S.	1-WS-2	184	1	69.9	7.35	52.91	22	1.4	U	0.136	U	0.136	23.3	2.2	0.058	0.158	0.0637	0.280	0.26	0.00	0.16	0.00	12
Reference ted 9/30/08	White Suckers	1-WS-3	219	1	112	23.9	81.7	21	0.94	0.0286	0.0764	0.0251	0.130	25.1	3.4	0.089	0.257	0.0847	0.430	0.36	0.08	0.22	0.07	13
30/08	ns a	1-WS-4	215	1	113.1	23.27	84.58	20	0.56	0.0210	0.0449	U	0.0659	23.9	3.2	0.108	0.213	0.0708	0.392	0.32	0.09	0.18	0.00	12
ere 9/3	p <u>i</u> t	1-WS-5	236	1	145.6	26.59	109.79	20	0.97	0.0293	0.0786	U	0.108	22.9	3.0	0.0764	0.197	0.0633	0.336	0.29	0.07	0.17	0.00	11
Ref	≥	1-WS-6	277	1	223	39.89	173.52	20	0.77	0.0279	0.0895	0.0275	0.145	22.7	3.2	0.0859	0.287	0.0926	0.466	0.41	0.08	0.25	0.08	15
Station 1-		1-WS-7	374	1	559.7	92.95	443.35	21	1.9	0.0629	0.178	0.0483	0.289	26.1	3.2	0.203	0.486	0.144	0.834	0.74	0.18	0.43	0.13	24
	g	1-P-1	134-156	5	433.4	63.2	358.1	25	1.4	0.0496	0.186	0.0599	0.296	25.5	4.0	0.172	0.705	0.209	1.090	0.97	0.15	0.63	0.19	26
Stat	Pumpkinseed Sunfish	1-P-2	96-118	8	245.7	40.74	193.89	27	2.4	0.0497	0.139	0.0494	0.238	28.2	5.6	0.105	0.261	0.105	0.471	0.43	0.10	0.24	0.10	9
۾ ر	n fi	1-P-3	101-114	7	208.2	34.97	161.93	24	1.2	0.0521	0.0572	U	0.109	28.2	5.4	0.258	0.395	0.138	0.790	0.67	0.22	0.34	0.00	14
	Su	1-P-4	120-133	4	196.6	32.13	157.22	23	1.4	0.0357	0.123	0.0347	0.194	26.6	5.2	0.156	0.633	0.143	0.932	0.81	0.14	0.55	0.12	17
	P	1-P-5	79-107	8	162.1	27.39	126.74	24	2.7	0.0435	0.120	0.0511	0.215	36.9	5.4	0.103	0.257	0.109	0.468	0.42	0.09	0.23	0.10	9
		2-WS-1	277	1	222.9	41.21	169	20	0.76	2.320	7.010	0.915	10.20	22.5	2.8	10.90	31.10	4.280	46.30	39.22	9.22	26.38	3.62	1593
	S	2-WS-2	234	1	142.9	23.47	114.65	22	1.4	4.540	15.70	U	20.30	22.2	1.8	7.30	21.20	U	28.50	27.11	6.83	20.27	0.00	1561
_ ∞	ker	2-WS-3	185	1	64.6	12.68	47.47	20	0.56	2.010	7.450	0.943	10.40	21.8	1.4	14.10	22.90	3.20	40.20	33.92	11.55	19.64	2.72	2658
# 5	Suc	2-WS-4	187	1	78	16.16	56.13	20	0.94	3.490	12.40	U	15.90	25.3	2.8	U	43.90	U	43.90	37.64	0.00	36.86	0.00	1595
ne '/	±.	2-WS-5	181	1	56.9	10.37	42.73							23.1	1.8	3.40	11.40	1.40	16.20	n/a	2.74	n/a	1.13	n/a
Site/Landfill scted 10/2/08	White Suckers	2-WS-6	137-153	3	103.4	15.25	75.72	19	0.83	1.510	6.430	0.663	8.60	22.7	1.1	U	25.0	U	25.0	22.25	0.00	21.89	0.00	2065
- Sid		2-WS-7	155-158	2	79.9	13.13	60.25	22	0.51	1.120	4.80	U	5.920	23.1	2.1	U	21.50	U	21.50	18.71	0.00	18.51	0.00	1048
Station 2- Site/ Date Collected 1		2-WS-8	93	1	9.8	n/a	n/a							25.2	1.6	2.770	6.340	1.110	10.20	n/a	0.00	n/a	0.00	n/a
it is	eq	2-P-1	111-129	6	245.7	39.99	196.39	24	0.87	0.409	0.929	U	1.340	25.6	3.3	2.950	6.50	U	9.450	8.08	2.52	5.56	0.00	264
Stati Date	umpkinseed Sunfish	2-P-2	92-113	12	290.3	55.18	231.08	25	1.1	0.848	2.080	U	2.930	26.0	3.4	4.480	10.80	U	15.30	12.92	3.78	9.12	0.00	415
	pki un	2-P-3	128-133	5	248.2	40.90	199.36	25	0.78	0.377	0.599	U	0.976	25.2	2.7	1.940	3.210	U	5.160	4.45	1.67	2.77	0.00	180
	Pur	2-P-4	136-147	6	399.1	66.65	316.58	26	0.80	0.493	1.170	U	1.660	26.8	4.2	4.270	11.0	U	15.20	12.85	3.61	9.29	0.00	335
<b> </b>	ш.	2-P-5	140-148	5	365.7	157.16	288.84	22	0.78	0.482	1.120	U	1.60	26.9	3.7	2.830	6.530	U	9.360	6.63	2.00	4.62	0.00	236
		3-WS-1	207 225	1	104.5	14.84 24.12	80.24	20 24	0.57 0.68	3.340 1.850	12.10 3.370	1.410 0.636	16.80 5.850	23.3 23.9	1.3 2.2	6.430 7.10	36.40	4.50 2.560	47.30 22.30	42.54	5.95 6.06	32.61	4.02 2.18	3531 983
1	S	3-WS-2 3-WS-3	324	1	131.1 375	69.98	97.11 286.34	24	1.1	2.490	7.350	0.636	10.60	23.9	3.2	13.60	12.60 43.0	4.080	60.70	19.03 50.86	11.42	10.76 36.00	3.42	983 1714
Site	cke	3-WS-3 3-WS-4	324	1	361.8	67.4	286.34	21	0.85	4.820	19.80	2.310	27.00	24.5	2.1	9.420	38.70	4.080	53.10	47.95	8.51	34.97	4.45	2656
13- Adjacent to Site Collected 10/2/08	White Suckers	3-WS-5	352	1	455.7	74.82	357.46	20	0.83	3.90	11.20	1.080	16.20	23.6	4.6	16.10	47.0	5.180	68.30	59.28	13.99	40.80	4.45	1533
10,	hite	3-WS-6	324	1	438.6	68.9	348.85	20	1.2	6.320	25.40	2.230	34.00	23.9	3.2	11.70	48.80	4.390	64.90	59.28	10.81	44.94	4.47	2161
jact	≥	3-WS-7	378	1	616.1	88.66	502.75	20	1.1	2.850	6.950	0.579	10.40	24.7	4.8	17.70	44.20	3.870	65.80	57.49	15.47	38.62	3.38	1307
Ad led		3-WS-8	371	1	602.7	86.02	490.41	21	0.90	3.330	9.190	0.726	13.20	24.7	4.6	13.50	40.20	3.870	53.80	47.74	11.98	35.57	0.00	1259
-€ O	_	3-W3-6 3-P-1	94-109	7	168.4	29.04	131.94	25	1.2	2.680	5.330	U.720	8.010	26.8	3.3	8.440	17.10	U	25.50	22.34	7.40	14.98	0.00	754
Station 3- Date Col	ee.	3-P-2	115-124	4	159.5	23.55	127.27	23	1.1	1.470	3.990	0.519	5.970	26.8	2.9	7.540	21.90	U	29.40	25.74	6.59	19.10	0.00	940
Sta	kins	3-P-3	130-136	5	271.4	39.05	221.94	24	0.84	0.834	2.760	0.245	3.830	26.3	3.4	6.730	22.90	U	29.70	25.83	5.85	19.89	0.00	811
1	'umpkinseed Sunfish	3-P-4	134-141	5	301.0	46.51	241.54	25	0.81	0.697	1.960	0.240	2.90	25.4	3.4	5.950	18.10	U	24.10	20.68	5.10	15.49	0.00	652
1	Pur	3-P-5	143-151	5	395.3	61.49	312.51	23	1.0	0.987	2.010	U	2.990	28.1	5.1	8.990	19.70	U	28.70	24.47	7.67	16.79	0.00	519
	1	J   J	175 151		555.5	01.73	312.31	2.5	1.0	0.507	2.010	Ū	2.550	20.1	5.1	0.550	15.70	Ŭ	20.70	47.7/	7.07	10.75	0.00	313

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									F	ish Filets (mg	/kg wet weig	ht)			Fish	Carcasses (m	ıg/kg wet we	ight)			Whole	Whole Body Concentrations			
		Sample Location	Length (mm)	# of Fish/ Sample	Mass (g)	Fillet Weight (g)	Carcass Weight (g)	% Solids	% Lipids	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	% Solids	% Lipids	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	Total PCBs	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs % Lipids	
		4-WS-1	155	1	41.3	7.82	30.61	20	0.78	1.230	2.190	U	3.420	23.6	1.8	3.330	6.140	U	9.470	8.24	2.90	5.34	0.00	508	
	v	4-WS-2	172	1	56.2	11.66	38.67	20	0.50	0.333	0.770	0.129	1.230	24.2	0.9	0.604	1.710	0.257	2.570	2.26	0.54	1.49	0.23	276	
e 8	ker	4-WS-3	194	1	82.6	11.41	62.1	22	0.78	1.050	1.850	0.165	3.070	22.4	2.4	5.340	9.70	U	15.0	13.15	4.67	8.48	0.00	589	
Station 4- Oakmoor Street Date Collected 9/30/08	White Suckers	4-WS-4	205	1	95.3	19.07	71.61	23	0.30	0.484	0.964	0.0891	1.540	24.0	0.8	1.360	2.980	U	4.340	3.75	1.18	2.56	0.00	536	
000	ite	4-WS-5	207	1	89	15.73	72.19	24	0.53	0.770	1.390	0.142	2.30	22.3	1.4	2.430	4.560	0.468	7.460	6.54	2.13	3.99	0.41	515	
ak ted	₹	4-WS-6	250	1	161.6	32.06	121.28	20	1.2	2.010	2.990	U	5.010	23.8	4.3	11.50	17.20	U	28.70	23.75	9.52	14.23	0.00	615	
o ≥		4-WS-7	244	1	149.5	30.5	111.97	23	1.5	2.170	3.220	U	5.390	22.8	3.6	6.670	9.460	U	16.10	13.81	5.71	8.12	0.00	428	
4 0	$\vdash$	4-WS-8	268	1	212.4	43.55	160.89	20	0.56	1.760	2.90	U	4.660	22.8	2.7	9.930	16.60	U	26.60	21.93	8.19	13.68	0.00	953	
tation	nse ish	4-P-1 4-P-2	98-118	7	213.6	42.73	157.44	24 27	1.6	1.580	2.190	0.202	3.980 3.960	27.9 26.9	3.6 3.8	5.780 6.20	8.590 10.40	U 1.390	14.40	12.18	4.88	7.22	0.00	368 447	
Sta	Pumpkinse ed Sunfish	4-P-2 4-P-3	146-151 120-146	3 5	268.8 273.6	46.48 49.29	206.13 208.26	27	0.67	1.460 0.497	2.180 0.772	0.309 0.0713	1.340	26.9	1.6	1.40	2.280	0.198	18.0	15.42 3.39	5.33	8.89 1.99	1.19 0.17	234	
	Pum ed S	4-P-3 4-P-4	120-146	5	285.1	49.29	208.26	22	0.67	0.497	0.772	U.U/13	1.480	28.0	4.3	2.980	4.590	U.198	3.880 7.570	6.62	1.23 2.61	4.01	0.17	173	
	π Ψ	5-WS-1	218	1	111.5	23.94	82.45	20	0.95	0.906	1.450	0.150	2.510	22.2	2.2	2.990	4.950	U	7.940	6.72	2.52	4.01	0.00	339	
		5-WS-1	227	1	124.1	22.1	177.08	20	0.95	0.550	1.450	U.150	1.610	22.2	2.2	3.030	5.950	U	8.980	8.16	2.75	5.41	0.00	436	
	S S	5-WS-3	268	1	224.3	35.92	177.08	20	1.1	2.020	3.110	U	5.140	22.1	3.0	6.940	10.60	U	17.50	15.42	6.11	9.34	0.00	564	
9 ne	White Suckers	5-WS-4	308	1	318	60.97	241.2	21	0.96	1.480	2.290	U	3.770	21.8	2.7	10.10	15.30	U	25.40	21.04	8.36	12.67	0.00	830	
wen 0/0	ıS e	5-WS-5	331	1	410	46.59	348.89	21	1.9	0.145	0.354	0.060	0.559	25.7	4.5	0.386	0.952	0.175	1.510	1.40	0.36	0.88	0.16	33	
n A 9/3	hit.	5-WS-6	382	1	622.3	96.79	486.3	21	1.6	3.340	5.550	U	8.890	24.8	4.5	13.70	22.30	U	36.0	31.50	11.98	19.52	0.00	759	
Clinton Avenue ected 9/30/08	>	5-WS-7	344	1	499.8	76.26	396.3	22	1.9	1.680	2.610	Ü	4.290	24.5	4.7	5.650	8.730	Ü	14.40	12.77	5.01	7.74	0.00	293	
		5-WS-8	407	1	702	96.9	566.98	21	1.7	1.830	2.50	U	4.340	23.3	5.1	6.480	8.820	U	15.30	13.70	5.80	7.90	0.00	293	
n 5- Col	д , р	5-P-1	141-160	6	553.0	75.68	436.06	23	0.74	0.733	1.460	0.158	2.350	27.8	3.1	4.050	9.780	0.977	14.80	12.96	3.56	8.55	0.86	454	
Station 5- Clinton Avenu Date Collected 9/30/08	Pumpk in- seed	5-P-2	130-147	6	421.2	63.43	321.78	23	0.86	0.585	1.180	U	1.770	26.8	2.8	2.290	4.670	U	6.960	6.11	2.01	4.10	0.00	242	
₩ -	_	5-BG-1	164-171	4	460.6	64.41	359.19	21	0.72	0.429	0.654	0.0603	1.140	26.5	3.9	3.830	6.210	U	10.0	8.65	3.31	5.37	0.00	241	
	Slue Gil Sunfish	5-BG-2	170-182	4	509.9	78.67	400.57	21	0.70	0.414	0.684	U	1.10	27.1	3.6	2.540	4.270	U	6.810	5.87	2.19	3.68	0.00	184	
	Blue	5-BG-3	140-163	5	361.3	55.54	284.46	22	0.83	0.484	0.745	U	1.230	25.0	3.0	1.940	3.170	U	5.110	4.48	1.70	2.77	0.00	167	
	te ers	6-WS-1	330	1	415.4	61.65	326.37	20	0.62	1.180	4.010	0.480	5.680	21.2	1.6	3.620	12.10	1.540	17.30	15.45	3.23	10.81	1.37	1055	
	White	6-WS-2	320	1	373.8	48.53	299.2	20	1.1	1.420	3.30	0.288	5.010	22.3	2.3	3.250	7.60	0.694	11.50	10.59	2.99	7.00	0.64	494	
	> 3	6-WS-3	255	1	196	39.54	140.4	22	1.1	0.530	0.817	U	1.350	24.1	3.5	1.770	2.690	U	4.460	3.78	1.50	2.28	0.00	126	
힏		6-C-1	600	1	4019.1	407.81	3855.52	28	9.0	8.660	12.90	U	21.60	32.5	6.4	2.290	3.280	U	5.570	7.10	2.90	4.20	0.00	102	
Station 6- New Market Pond Date Collected 10/1/08		6-C-2	480	1	1834.4	305.16	1587.56	24	4.1	2.050	3.040	U	5.080	26.1	3.7	2.140	3.140	U	5.280	5.25	2.13	3.12	0.00	140	
ket /1/		6-C-3	550	1	2659.1	354.06	2494.75	27	4.2	4.540	10.20	U	14.70	31.4	10.1	11.30	25.10	U	36.40	33.70	10.46	23.25	0.00	359	
Aar 3 10	Carp	6-C-4	640	1	4274.4	566.99	3636.73	24	3.8	5.020	11.80	U	16.80	28.1	6.7	4.750	11.0	U	15.80	15.93	4.79	11.11	0.00	264	
w v	ŭ	6-C-5	580	1	2800.4	309.8	2721.55	26	3.2	2.170	2.980	U	5.150	36.4	10.1	7.880	10.70	U	18.60	17.23	7.30	9.91	0.00	182	
S S		6-C-6	420	1	1186.4	145.47	1147.37	24	4.0	1.690	2.810	0.209	4.710	29.6	7.0	3.50	6.120	U	9.620	9.07	3.30	5.75	0.00	135	
9 00 00		6-C-7	330	1	739	89.5	680.38	24	3.3	1.40	2.130	U	3.530	29.8	8.6	4.120	6.180	U	10.30	9.51	3.80	5.71	0.00	118	
tion	$\vdash$	6-C-8	420	1	1107	152.04	1133.97	23	3.1	1.260	1.890	U	3.150	29.9	5.1	2.270	3.260	U	5.530	5.25	2.15	3.10	0.00	108	
Stat	_	6-BG-1	165-175	5	552.5	82.55	441.80	21	0.64	0.277	0.589	U	0.866	26.3	2.7	1.620	3.830	U	5.460	4.74	1.41	3.32	0.00	192	
	등등	6-BG-2	141-157	5	380.2	62.63	293.43	21	0.72	0.332	0.507	U	0.839	27.2	2.9	2.0	3.240	U	5.250	4.47	1.71	2.76	0.00	170	
	Blue Gil Sunfish	6-BG-3 6-BG-4	105-132 135-162	5 5	181.9 386.8	29.42 67.93	141.01 304.36	21 21	0.68	0.359 0.195	0.507 0.284	U	0.866	25.5 25.0	2.5 2.5	1.640	2.460 2.180	U	4.10 3.570	3.54	1.42	2.12 1.83	0.00	158 138	
	B 0,	6-BG-4 6-BG-5	153-162	5	457.6	74.70	668.53	21	0.42	0.195	0.284	U	0.479	25.0	1.7	1.380 0.776	1.160	U	1.940	1.76	0.70	1.83	0.00	138	
<u> </u>		U-0U-0	100-1/2	Э	437.0	/4./0	008.53	21	0.10	0.0594	0.0859	U	0.145	25.4	1./	0.776	1.100	U	1.940	1.70	0.70	1.05	0.00	111	

Table 1. Aroclor and Total PCB Accumulation in Fish Filets, Carcasses and Whole Body Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

									F	ish Filets (mg/	kg wet weig	ht)			Fish	Carcasses (m	g/kg wet we	ight)			Whol	e Body Con	centrations	
		Sample Location	Length (mm)	# of Fish/ Sample	Mass (g)	Fillet Weight (g)	Carcass Weight (g)	% Solids	% Lipids	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	% Solids	% Lipids	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	Total PCBs	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs % Lipids
	e: ers	7-WS-1	380	1	657.7	108.34	526.57	24	3.1	0.688	1.030	U	1.720	24.8	5.4	1.350	2.050	U	3.40	3.11	1.24	1.88	0.00	62
	White	7-WS-2	340	1	469.6	73.91	348.65	20	1.3	1.020	1.410	0.130	2.570	21.8	2.3	2.270	3.090	U	5.360	4.87	2.05	2.80	0.00	227
	S v	7-WS-3	355	1	526.3	77.76	453.59	21	1.9	1.40	1.910	U	3.320	24.4	4.9	4.720	6.720	U	11.40	10.22	4.23	6.02	0.00	224
		7-C-1	665	1	5070.4	458.9	4460.59	22	2.7	1.240	2.520	U	3.760	30.6	6.6	4.440	8.370	U	12.80	11.96	4.14	7.82	0.00	189
e %		7-C-2	625	1	3431.4	378.69	3061.74	24	3.8	0.140	0.465	0.125	0.730	28.5	7.3	0.327	1.230	0.309	1.870	1.74	0.31	1.15	0.29	25
ng Lake 10/1/08		7-C-3	550	1	2464.4		2381.35	24	3.3	1.970	2.470	U	4.440	30.1	7.4	6.110	8.120	U	14.20	13.27	5.71	7.58	0.00	186
ring d 10	arp	7-C-4	570	1	2715.4		2608.15	28	8.2	11.10	17.40	U	28.50	35.8	12.4	22.10	33.60	2.110	57.80	55.01	21.05	32.06	0.00	455
Spr	రి	7-C-5	530	1	2004.4	206.42	1927.75	23	3.7	0.0674	0.223	0.067	0.357	31.0	8.1	0.157	0.518	0.140	0.815	0.77	0.15	0.49	0.13	10
-7- ∥e		7-C-6	580	1	3512.4	261.46	3401.93	23	3.7	0.130	0.568	0.133	0.830	29.2	5.5	0.177	0.792	0.188	1.160	1.14	0.17	0.78	0.18	21
<u>0</u> 0		7-C-7	585	1	2942.4	339.53	2721.55	26	3.8	0.0599	0.192	0.0457	0.298	35.0	10.0	0.196	0.539	0.129	0.864	0.80	0.18	0.50	0.12	9
Stat		7-C-8	570	1	2744.4	376.47	2494.75	25	4.4	1.090	2.290	U	3.380	28.9	6.1	1.90	3.360	U	5.260	5.01	1.79	3.22	0.00	85
S S	_	7-BG-1	155-170	5	488.0	84.81	383.00	21	0.86	0.335	0.486	U	0.821	28.2	3.1	1.180	1.880	U	3.060	2.65	1.03	1.63	0.00	98
	Gill	7-BG-2	136-160	5	308.3	54.17	237.06	20	0.74	0.0984	0.220	U	0.318	26.1	3.2	0.532	1.170	U	1.70	1.44	0.45	0.99	0.00	51
	Blue Sunf	7-BG-3	126-140	5	239.8	43.78	187.05	22	0.67	0.044	0.0655	U	0.109	26.0	3.6	0.392	0.505	U	0.897	0.75	0.33	0.42	0.00	23
	BIS	7-BG-4	126-155	5	262.8	45.28	204.75	21	0.76	0.0834	0.161	U	0.245	25.8	3.4	0.375	0.621	U	0.996	0.86	0.32	0.54	0.00	30
		7-BG-5	136-160	5	381.8	62.89	301.24	21	0.49	0.0984	0.159	U	0.257	25.7	2.4	0.647	1.050	U	1.70	1.45	0.55	0.90	0.00	68

U- Not detected

J- Value is estimated

N- Presumptively present
UJ- Not detected and reporting limit is estimated

Table 2. Fish Collected at Station 1- Reference Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

# Date Collected 9/30/08

	Ir	ndividual Fis	.ength (mm	Weight (g)
		1-WS-1	151	36.7
	<u>n</u>	1-WS-2	184	69.9
	S C K	1-WS-3	219	112.0
, O cital	0	1-WS-4	215	113.1
	<u> </u>	1-WS-5	236	145.6
1	2	1-WS-6	277	223.0
_		1-WS-7	374	559.7
		1-P-1-1	152	116.1
	_	1-P-1-2	156	96.6
	1-P-1	1-P-1-3	147	94.6
	<del>-</del>	1-P-1-4	136	61.2
		1-P-1-5	134	64.9
		1-P-2-1	118	42.1
		1-P-2-2	106	30.4
		1-P-2-3	113	38.3
	1-P-2	1-P-2-4	114	38.8
	+	1-P-2-5	98	22.7
		1-P-2-6	96	22.7
		1-P-2-7	101	24.3
چ		1-P-2-8	102	26.4
nfi;		1-P-3-1	103	24.1
Su		1-P-3-2	108	30.4
þ	က	1-P-3-3	101	24.2
esc	1-P-3	1-P-3-4	110	32.0
ķ	<del>-</del>	1-P-3-5	106	28.0
Pumpkinseed Sunfish		1-P-3-6	108	32.5
_ ਯੁ		1-P-3-7	114	37.0
		1-P-4-1	133	59.6
	1-P-4	1-P-4-2	124	38.4
	<del>-</del>	1-P-4-3	120	44.5
		1-P-4-4	123	54.1
		1-P-5-1	107	33.0
		1-P-5-2	90	18.5
		1-P-5-3	90	17.7
	1-P-5	1-P-5-4	102	26.3
	<u>+</u>	1-P-5-5	97	20.6
		1-P-5-6	91	17.7
		1-P-5-7	90	15.2
		1-P-5-8	79	13.1

# Table 3. Fish Collected at Station 2- Site/Landfill Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

# Date Collected 10/2/08

		Individual Fish	Length (mm)	Weight (g)
		2-WS-1	277	222.9
		2-WS-2	234	142.9
		2-WS-3	185	64.6
S		2-WS-4	187	78.0
ker		2-WS-5	181	56.9
White Suckers	9-	2-WS-6-1	137	27.3
ite	2-WS-6	2-WS-6-2	151	38.4
×		2-WS-6-3	153	37.7
	2-WS-7	2-WS-7-1	158	38.4
		2-WS-7-2	155	41.5
		2-WS-8	93	9.8
		2-P-1-1	123	46.7
		2-P-1-2	117	39.0
	۲-1	2-P-1-3	124	43.1
	2-P-1	2-P-1-4	129	50.1
		2-P-1-5	111	31.6
		2-P-1-6	117	35.2
		2-P-2-1	96	20.5
		2-P-2-2	108	20.7
sh		2-P-2-3	104	25.0
nfi		2-P-2-4	106	27.3
d Sı		2-P-2-5	94	17.9
Pumpkinseed Sunfish	2-b-2	2-P-2-6	106	25.3
kin	2-	2-P-2-7	108	27.6
dwr		2-P-2-8	113	31.7
Pı		2-P-2-9	97	22.7
		2-P-2-10	106	27.3
		2-P-2-11	107	27.2
		2-P-2-12	92	17.1
		2-P-3-1	129	49.9
	3	2-P-3-2	133	51.7
	2-P-3	2-P-3-3	132	51.0
	(1	2-P-3-4	128	49.7
		2-P-3-5	128	45.9

# Table 2 Continued. Fish Collected at Station 2- Site/Landfill Cornell Dublier Site South Plainfield, NJ

# Date Collected 10/2/08

		Individual Fish	Length (mm)	Weight (g)
		2-P-4-1	138	64.0
		2-P-4-2	141	71.7
l sh	2-P-4	2-P-4-3	138	65.3
ınfi	2-⊦	2-P-4-4	147	77.1
Pumpkinseed Sunfish		2-P-4-5	136	59.4
see		2-P-4-6	139	61.6
kin		2-P-5-1	148	78.7
mp		2-P-5-2	140	72.1
Pu	2-P-5	2-P-5-3	146	75.4
		2-P-5-4	143	69.0
		2-P-5-5	146	70.5

# Table 4. Fish Collected at Station 3-Adjacent to Site Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

# Date Collected 10/2/08

		Individual Fish	Length (mm)	Weight (g)
		3-WS-1	207	104.5
	'n	3-WS-2	225	131.1
3	ב	3-WS-3	324	375.0
	anc	3-WS-4	322	361.8
	ם ב	3-WS-5	352	455.7
7, 7, 7, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	- >	3-WS-6	324	438.6
		3-WS-7	378	616.1
		3-WS-8	371	602.7
		3-P-1-1	101	22.7
		3-P-1-2	107	28.1
	T	3-P-1-3	104	24.5
	3-P-1	3-P-1-4	109	29.9
	(1)	3-P-1-5	103	24.9
		3-P-1-6	94	18.4
		3-P-1-7	96	19.9
		3-P-2-1	115	36.2
	3-P-2	3-P-2-2	115	36.3
	3-Е	3-P-2-3	120	43.0
Pumpkinseed Sunfish		3-P-2-4	124	44.0
Sun		3-P-3-1	134	51.7
eq	~	3-P-3-2	130	52.1
nse	3-P-3	3-P-3-3	130	47.0
ıpki	3	3-P-3-4	136	65.5
nn		3-P-3-5	133	55.1
-		3-P-4-1	141	62.6
	_	3-P-4-2	137	62.6
	3-P-4	3-P-4-3	134	53.4
	3	3-P-4-4	137	61.7
		3-P-4-5	137	60.7
		3-P-5-1	151	83.1
		3-P-5-2	144	78.1
	3-P-5	3-P-5-3	143	72.8
	3-6	3-P-5-4	150	82.2
		3-P-5-5	147	79.1

# Table 5. Fish Collected at Station 4-Oakmoor Street Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

# Date Collected 9/30/08

		Individual Fish	Length (mm)	Weight (g)
		4-WS-1	155	41.3
	,	4-WS-2	172	56.2
3	ב ב	4-WS-3	194	82.6
	) nc	4-WS-4	205	95.3
7, 7, 7, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	ָ בֿי	4-WS-5	207	89.0
2	<u> </u>	4-WS-6	250	161.6
		4-WS-7	244	149.5
		4-WS-8	268	212.4
		4-P-1-1	98	21.0
		4-P-1-2	103	30.2
	l l	4-P-1-3	112	36.9
	4-P-1	4-P-1-4	116	38.1
	4	4-P-1-5	98	23.0
		4-P-1-6	101	23.1
		4-P-1-7	118	41.3
fish	~	4-P-2-1	151	91.9
Sun	4-P-2	4-P-2-2	146	87.8
eq	4	4-P-2-3	148	89.1
nse		4-P-3-1	141	74.2
Pumpkinseed Sunfish	~	4-P-3-2	124	43.2
un	4-P-3	4-P-3-3	136	56.0
	4	4-P-3-4	120	45.9
		4-P-3-5	146	54.3
		4-P-4-1	131	55.3
	_	4-P-4-2	137	66.5
	4-P-4	4-P-4-3	132	62.8
	4	4-P-4-4	123	44.8
		4-P-4-5	136	55.7

# Table 6. Fish Collected at Station 5- Clinton Avenue Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

# Date Collected 9/30/08

		Individual Fish	Length (mm)	Weight (g)
		5-WS-1	218	111.5
∥ ,	,	5-WS-2	227	124.1
	ב ב	5-WS-3	268	224.3
	) nc	5-WS-4	308	318.0
0.4/A/A/C	ָ בֿי	5-WS-5	331	410.0
4	>	5-WS-6	382	622.3
		5-WS-7	344	499.8
		5-WS-8	407	702.0
		5-P-1-1	141	74.2
		5-P-1-2	141	74.7
_	5-P-1	5-P-1-3	152	91.7
fish	5-[	5-P-1-4	160	101.4
Sun		5-P-1-5	156	105.9
pa		5-P-1-6	155	105.1
nse		5-P-2-1	136	60.8
pki		5-P-2-2	130	62.5
Pumpkinseed Sunfish	5-P-2	5-P-2-3	147	86.3
	5-F	5-P-2-4	134	66.4
		5-P-2-5	141	76.8
		5-P-2-6	138	68.4
		5-BG-1-1	170	119.1
	5-BG-1	5-BG-1-2	168	118.5
	2-B	5-BG-1-3	171	113.7
		5-BG-1-4	164	109.3
ish		5-BG-2-1	170	106.6
nu	9-2	5-BG-2-2	182	148.4
≡	5-BG-2	5-BG-2-3	173	127.6
ue Gill Sunfish	5	5-BG-2-4	174	127.3
Blu		5-BG-3-1	142	71.4
	9	5-BG-3-2	140	61.9
	5-BG-3	5-BG-3-3	151	76.7
		5-BG-3-4	163	86.5
		5-BG-3-5	143	64.8

Table 7. Fish Collected at Station 6-New Market Pond Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

# Date Collected 10/1/08

		Individual Fish	Length (mm)	Weight (g)
e.	SLS	6-WS-1	330	415.4
White	Suckers	6-WS-2	320	373.8
>	Su	6-WS-3	255	196.0
		6-C-1	600	4019
		6-C-2	480	1834
		6-C-3	550	2659
2	Calp	6-C-4	640	4274
,	ڏ	6-C-5	580	2800
		6-C-6	420	1186
		6-C-7	330	739
		6-C-8	420	1107
		6-BG-1-1	169	114.3
	-1	6-BG-1-2	170	107.7
	6-BG-1	6-BG-1-3	165	104.8
	9	6-BG-1-4	175	108.7
		6-BG-1-5	175	117.0
		6-BG-2-1	155	87.6
	-5	6-BG-2-2	148	83.4
	6-BG-2	6-BG-2-3	157	83.5
	9	6-BG-2-4	147	64.1
		6-BG-2-5	141	61.6
ish		6-BG-3-1	132	45.1
nn	ကု	6-BG-3-2	130	45.7
S III	6-BG-3	6-BG-3-3	106	26.9
Blue Gill Sunfish	-9	6-BG-3-4	105	23.7
Blu		6-BG-3-5	124	40.5
		6-BG-4-1	135	53.6
	3-4	6-BG-4-2	162	85.9
	6-BG-	6-BG-4-3	162	89.9
	-9	6-BG-4-4	143	68.5
		6-BG-4-5	162	88.9
		6-BG-5-1	167	99.2
	ċ	6-BG-5-2	163	90.7
	6-BG-5	6-BG-5-3	155	82.7
	-9	6-BG-5-4	153	75.8
		6-BG-5-5	172	109.2

# Table 8. Fish Collected at Station 7-Spring Lake Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

# Date Collected 10/1/08

		Individual Fish	Length (mm)	Weight (g)
به	rs	7-WS-1	380	657.7
White	Suckers	7-WS-2	340	469.6
5	Su	7-WS-3	355	526.3
		7-C-1	665	5070
		7-C-2	625	3431
		7-C-3	550	2464
2	Calp	7-C-4	570	2715
'	ڏ	7-C-5	530	2004
		7-C-6	580	3512
		7-C-7	585	2942
		7-C-8	570	2744
		7-BG-1-1	170	105.8
	-1	7-BG-1-2	170	107.7
	7-BG-1	7-BG-1-3	165	108.2
	7	7-BG-1-4	165	84.1
		7-BG-1-5	155	82.2
		7-BG-2-1	160	76.1
	-5	7-BG-2-2	145	61.7
	7-BG-2	7-BG-2-3	142	54.2
	7	7-BG-2-4	136	54.4
		7-BG-2-5	140	61.9
ish		7-BG-3-1	140	52.9
nn	٠.	7-BG-3-2	136	53.3
E	7-BG-3	7-BG-3-3	130	46.7
Blue Gill Sunfish	7	7-BG-3-4	134	47.2
Blu		7-BG-3-5	126	39.7
		7-BG-4-1	131	50.3
	9-4	7-BG-4-2	135	49.2
	7-BG	7-BG-4-3	155	70.9
	7-	7-BG-4-4	135	48.7
		7-BG-4-5	126	43.7
		7-BG-5-1	160	87.7
	ċ	7-BG-5-2	155	72.4
	7-BG-5	7-BG-5-3	136	62.3
		7-BG-5-4	155	83.6
		7-BG-5-5	150	75.8

## Table 9a-c . PCB Nomenclature Categories Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

Table 1a. PCB Categories\*

Category	No. of individual compounds <sup>1</sup>
Congener	209
Homolog	10
Isomers/homolog	1-46

<sup>&</sup>lt;sup>1</sup>Natural isotopic abundance only.

Table 9b. Composition of Chlorinated Biphenyls by Homolog\*

Table 9b. Composition of Chlorinated biprierrys by nomolog						
Empirical formula chloro-biphenyls	Base molecular weight <sup>1</sup>	Mean molecular weight <sup>2</sup>	Chlorine (%)	No. of isomers		
C <sub>12</sub> H <sub>9</sub> Cl	188.0	188.7	19	3		
C <sub>12</sub> H <sub>8</sub> Cl <sub>2</sub>	222.0	223.1	32	12		
$C_{12}H_8CI_2$ $C_{12}H_7CI_3$	256.0	257.6	41	24		
C <sub>12</sub> H <sub>6</sub> Cl <sub>4</sub>	289.9	292	49	42		
$C_{12}H_5CI_5$ $C_{12}H_4CI_6$	323.9	326.4	54	46		
C <sub>12</sub> H <sub>4</sub> Cl <sub>6</sub>	357.8	360.9	59	42		
C <sub>12</sub> H <sub>3</sub> Cl <sub>7</sub>	391.8	395.3	63	24		
C <sub>12</sub> H <sub>2</sub> Cl <sub>8</sub>	425.8	429.8	66	12		
C <sub>12</sub> HCl <sub>9</sub>	459.7	464.2	69	3		
C <sub>12</sub> Cl <sub>10</sub>	493.7	498.7	71	1		

<sup>&</sup>lt;sup>1</sup> Based on <sup>35</sup>Cl (atomic weight 34.969), <sup>12</sup>C (atomic weight 12.000), and <sup>1</sup>H (atomic weight 1.0079).

Table 9c. Average Molecular Composition (wt.%) of some Aroclors\*

Homolog	Aroclor					
Homolog (chlorines)	1221	1016	1242	1248	1254	1260
0	10					
1	50	2	1			
2	35	19	13	1		
3	4	57	45	22	1	
4	1	22	31	49	15	
5			10	27	53	12
6				2	26	42
7					4	38
8						7
9						1

<sup>\*</sup>Source: Erickson, M.D. 1997. Analytical Chemistry of PCBs. 2nd Edition. CRC Press Inc., New York. 667pp.

<sup>&</sup>lt;sup>2</sup> Based on natural isotopic abundance of carbon, chloride, and hydrogen.

## Table 10: PCB Congeners by Number Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

PCB Congeners	Number	Congener Name
2-MoCB	1	2-Chlorobiphenyl
3-MoCB	2	3- Chlorobiphenyl
4-MoCB	3	4-Chlorobiphenyl
2,2'-DiCB	4	2,2'-Dichlorobiphenyl
2,3-DiCB	5	2,3- Dichlorobiphenyl
2,3'-DiCB	6	2,3'-Dichlorobiphenyl
2,4-DiCB	7	2,4-Dichlorobiphenyl
2,4'-DiCB	8	2,4'-Dichlorobiphenyl
2,5-DiCB	9	2,5-Dichlorobiphenyl 2,6- Dichlorobiphenyl
2,6-DiCB 3,3'-DiCB	11	3,3'-Dichlorobiphenyl
3,5-DiCB 3,5-DiCB	14	3,5-Dichlorobiphenyl
4,4'-DiCB	15	4,4'-Dichlorobiphenyl
2,2',3-TrCB	16	2,2',3-Trichlorobiphenyl
2,2',4-TrCB	17	2,2',4-Trichlorobiphenyl
2,2',6-TrCB	19	2,2',6-Trichlorobiphenyl
2,3,4'-TrCB	22	2,3,4'-Trichlorobiphenyl
2,3,5-TrCB	23	2,3,5-Trichlorobiphenyl
2,3,6-TrCB	24	2,3,6-Trichlorobiphenyl
2,3',4-TrCB	25	2,3',4-Trichlorobiphenyl
2,3',6-TrCB	27	2,3',6-Trichlorobiphenyl
2,4',5-TrCB	31	2,4',5-Trichlorobiphenyl
2,4',6-TrCB	32	2,4',6-Trichlorobiphenyl
2,3',5'-TrCB	34	2,3',5'-Trichlorobiphenyl
3,3',4-TrCB	35	3,3',4-Trichlorobiphenyl
3,3',5-TrCB	36	3,3',5-Trichlorobiphenyl
3,4,4'-TrCB	37	3,4,4'-Trichlorobiphenyl
3,4,5-TrCB	38	3,4,5-Trichlorobiphenyl 3,4',5-Trichlorobiphenyl
3,4',5-TrCB	39 42	2,2',3,4'-Tetrachlorobiphenyl
2,2',3,4'-TeCB 2,2',3,5-TeCB	43	2,2',3,5-Tetrachlorobiphenyl
2,2',3,6'-TeCB	46	2,2',3,6'-Tetrachlorobiphenyl
2,2',4,5-TeCB	48	2,2',4,5-Tetrachlorobiphenyl
2,2',5,5'-TeCB	52	2,2',5,5'-Tetrachlorobiphenyl
2,2',6,6'-TeCB	54	2,2',6,6'-Tetrachlorobiphenyl
2,3,3',4-TeCB	55	2,3,3',4-Tetrachlorobiphenyl
2,3,3',4'-TeCB	56	2,3,3',4'-Tetrachlorobiphenyl
2,3,3',5-TeCB	57	2,3,3',5-Tetrachlorobiphenyl
2,3,3',5'-TeCB	58	2,3,3',5'-Tetrachlorobiphenyl
2,3,4,4'-TeCB	60	2,3,4,4'-Tetrachlorobiphenyl
2,3,4',5-TeCB	63	2,3,4',5-Tetrachlorobiphenyl
2,3,4',6-TeCB	64	2,3,4',6-Tetrachlorobiphenyl
2,3',4,4'-TeCB	66	2,3',4,4'-Tetrachlorobiphenyl
2,3',4,5-TeCB	67	2,3',4,5-Tetrachlorobiphenyl
2,3',4,5'-TeCB	68	2,3',4,5'-Tetrachlorobiphenyl
2,3',5,5'-TeCB	72	2,3',5,5'-Tetrachlorobiphenyl
2,3',5',6-TeCB	73	2,3',5',6-Tetrachlorobiphenyl
3,3',4,4'-TeCB 3,3',4,5-TeCB	77	3,3',4,4'-Tetrachlorobiphenyl 3,3',4,5-Tetrachlorobiphenyl
3,3',4,5'-TeCB	78 79	3,3',4,5'-Tetrachlorobiphenyl
3,3',5,5'-TeCB	80	3,3',5,5'-Tetrachlorobiphenyl
3,4,4',5-TeCB	81	3,4,4',5-Tetrachlorobiphenyl
2,2',3,3',4-PeCB	82	2,2',3,3',4-Pentachlorobiphenyl
2,2',3,3',5-PeCB	83	2,2',3,3',5-Pentachlorobiphenyl
2,2',3,3',6-PeCB	84	2,2',3,3',6-Pentachlorobiphenyl
2,2',3,4,6'-PeCB	89	2,2',3,4,6'-Pentachlorobiphenyl
2,2',3,5,5'-PeCB	92	2,2',3,5,5'-Pentachlorobiphenyl
2,2',3,5,6'-PeCB	94	2,2',3,5,6'-Pentachlorobiphenyl
2,2',3,5',6-PeCB	95	2,2',3,5',6-Pentachlorobiphenyl
2,2',3,6,6'-PeCB	96	2,2',3,6,6'-Pentachlorobiphenyl
2,2',4,4',5-PeCB	99	2,2',4,4',5-Pentachlorobiphenyl
2,2',4,5',6-PeCB	103	2,2',4,5',6-Pentachlorobiphenyl
2,2',4,6,6'-PeCB	104	2,2',4,6,6'-Pentachlorobiphenyl
2,3,3',4,4'-PeCB	105	2,3,3',4,4'-Pentachlorobiphenyl
2,3,3',4,5-PeCB	106	2,3,3',4,5-Pentachlorobiphenyl
2,3,3',4,6-PeCB	109	2,3,3',4,6-Pentachlorobiphenyl
2,3,3',5,5'-PeCB	111	2,3,3',5,5'-Pentachlorobiphenyl
2,3,3',5,6-PeCB	112	2,3,3',5,6-Pentachlorobiphenyl

		Tank was not all the t
2,3',4,4',5-PeCB	118	2,3',4,4',5-Pentachlorobiphenyl
2,3',4,5,5'-PeCB	120	2,3',4,5,5'-Pentachlorobiphenyl
2,3',4,5',6-PeCB	121	2,3',4,5',6-Pentachlorobiphenyl
2,3,3',4',5'-PeCB	122	2,3,3',4',5'-Pentachlorobiphenyl
2,3',4,4',5'-PeCB	123	2,3',4,4',5'-Pentachlorobiphenyl
3,3',4,4',5-PeCB	126	3,3',4,4',5-Pentachlorobiphenyl
3,3',4,5,5'-PeCB	127	3,3',4,5,5'-Pentachlorobiphenyl
2,2',3,3',4,5'-HxCB	130	2,2',3,3',4,5'-Hexachlorobiphenyl
2,2',3,3',4,6-HxCB	131	2,2',3,3',4,6-Hexachlorobiphenyl
2,2',3,3',4,6'-HxCB	132	2,2',3,3',4,6'-Hexachlorobiphenyl
2,2',3,3',5,5'-HxCB	133	2,2',3,3',5,5'-Hexachlorobiphenyl
2,2',3,3',6,6'-HxCB	136	2,2',3,3',6,6'-Hexachlorobiphenyl
2,2',3,4,4',5-HxCB	137	2,2',3,4,4',5-Hexachlorobiphenyl
2,2',3,4,5,5'-HxCB	141	2,2',3,4,5,5'-Hexachlorobiphenyl
2,2',3,4,5,6-HxCB	142	2,2',3,4,5,6-Hexachlorobiphenyl
2,2',3,4,5',6-HxCB	144	2,2',3,4,5',6-Hexachlorobiphenyl
2,2',3,4,6,6'-HxCB	145	2,2',3,4,6,6'-Hexachlorobiphenyl
2,2',3,4',5,5'-HxCB	146	2,2',3,4',5,5'-Hexachlorobiphenyl
2,2',3,4',5,6'-HxCB	148	2,2',3,4',5,6'-Hexachlorobiphenyl
2,2',3,4',6,6'-HxCB	150	2,2',3,4',6,6'-Hexachlorobiphenyl
2,2',3,5,6,6'-HxCB	152	2,2',3,5,6,6'-Hexachlorobiphenyl
2,2',4,4',5,6'-HxCB	154	2,2',4,4',5,6'-Hexachlorobiphenyl
2,2',4,4',6,6'-HxCB	155	2,2',4,4',6,6'-Hexachlorobiphenyl
2,3,3',4,4',6-HxCB	158	2,3,3',4,4',6-Hexachlorobiphenyl
2,3,3',4,5,5'-HxCB	159	2,3,3',4,5,5'-Hexachlorobiphenyl
2,3,3',4,5,6-HxCB	160	2,3,3',4,5,6-Hexachlorobiphenyl
2,3,3',4,5',6-HxCB	161	2,3,3',4,5',6-Hexachlorobiphenyl
2,3,3',4',5,5'-HxCB	162	2,3,3',4',5,5'-Hexachlorobiphenyl
2,3,3',4',5',6-HxCB	164	2,3,3',4',5',6-Hexachlorobiphenyl
2,3,3',5,5',6-HxCB	165	2,3,3',5,5',6-Hexachlorobiphenyl
2,3',4,4',5,5'-HxCB	167	2,3',4,4',5,5'-Hexachlorobiphenyl
3,3',4,4',5,5'-HxCB	169	3,3',4,4',5,5'-Hexachlorobiphenyl
2,2',3,3',4,4',5-HpCB	170	2,2',3,3',4,4',5-Heptachlorobiphenyl
2,2',3,3',4,5,5'-HpCB	172	2,2',3,3',4,5,5'-Heptachlorobiphenyl
2,2',3,3',4,5,6'-HpCB	174	2,2',3,3',4,5,6'-Heptachlorobiphenyl
2,2',3,3',4,5',6-HpCB	175	2,2',3,3',4,5',6-Heptachlorobiphenyl
2,2',3,3',4,6,6'-HpCB	176	2,2',3,3',4,6,6'-Heptachlorobiphenyl
2,2',3,3',4,5',6'-HpCB	177	2,2',3,3',4,5',6'-Heptachlorobiphenyl
2,2',3,3',5,5',6-HpCB	178	2,2',3,3',5,5',6-Heptachlorobiphenyl
2,2',3,3',5,6,6'-HpCB	179	2,2',3,3',5,6,6'-Heptachlorobiphenyl
2,2',3,4,4',5,6-HpCB	181	2,2',3,4,4',5,6-Heptachlorobiphenyl
2,2',3,4,4',5,6'-HpCB	182	2,2',3,4,4',5,6'-Heptachlorobiphenyl
2,2',3,4,4',6,6'-HpCB	184	2,2',3,4,4',6,6'-Heptachlorobiphenyl
2,2',3,4,5,6,6'-HpCB	186	2,2',3,4,5,6,6'-Heptachlorobiphenyl
2,2',3,4',5,5',6-HpCB	187	2,2',3,4',5,5',6-Heptachlorobiphenyl
2,2',3,4',5,6,6'-HpCB	188	2,2',3,4',5,6,6'-Heptachlorobiphenyl
2,3,3',4,4',5,5'-HpCB	189	2,3,3',4,4',5,5'-Heptachlorobiphenyl
2,3,3',4,4',5,6-HpCB	190	2,3,3',4,4',5,6-Heptachlorobiphenyl
2,3,3',4,4',5',6-HpCB	191	2,3,3',4,4',5',6-Heptachlorobiphenyl
2,3,3',4,5,5',6-HpCB	192	2,3,3',4,5,5',6-Heptachlorobiphenyl
2,2',3,3',4,4',5,5'-OcCB	194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl
2,2',3,3',4,4',5,6-OcCB	195	2,2',3,3',4,4',5,6-Octachlorobiphenyl
2,2',3,3',4,4',5,6'-OcCB	196	2,2',3,3',4,4',5,6'-Octachlorobiphenyl
2,2',3,3',4,5',6,6'-OcCB	201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl
2,2',3,3',5,5',6,6'-OcCB	202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl
2,2',3,4,4',5,5',6-OcCB	203	2,2',3,4,4',5,5',6-Octachlorobiphenyl
2,2',3,4,4',5,6,6'-OcCB	204	2,2',3,4,4',5,6,6'-Octachlorobiphenyl
2,3,3',4,4',5,5',6-OcCB	205	2,3,3',4,4',5,5',6-Octachlorobiphenyl
2,2',3,3',4,4',5,5',6-NoCB	206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
2,2',3,3',4,4',5,6,6'-NoCB	207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl
2,2',3,3',4,5,5',6,6'-NoCB	208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl
Decachlorobiphenyl	209	Decachlorobiphenyl
(12/13)	13-Dec	3,4-Dichlorobiphenyl 3,4'-Dichlorobiphenyl
(107/124)	107/124	2,3,3',4',5-Pentachlorobiphenyl
(110/115)	110/115	2,3,3',4',6-Pentachlorobiphenyl/2,3,4,4',6-Pentachlorobiphenyl
(128/166)	128/166	2,2',3,3',4,4'-Hexachlorobiphenyl/ 2,3,4,4',5,6-Hexachlorobiphenyl
(129/138/163)	129/138/163	2,2',3,3',4,5-Hexachlorobiphenyl/ 2,2',3,4,4',5'-Hexachlorobiphenyl/ 2,3,3',4',5,6-Hexachlorobiphenyl
(134/143)	134/143	2,2',3,3',5,6-Hexachlorobiphenyl/ 2,2',3,4,5,6'-Hexachlorobiphenyl
(135/151)	135/151	2,2',3,3',5,6'-Hexachlorobiphenyl/ 2,2',3,5,5',6-Hexachlorobiphenyl

(139/140)	139/140	2,2',3,4,4',6-Hexachlorobiphenyl/ 2,2',3,4,4',6'-Hexachlorobiphenyl
(147/149)	147/149	2,2',3,4',5,6-Hexachlorobiphenyl/ 2,2',3,4',5',6-Hexachlorobiphenyl
(153/168)	153/168	2,2',4,4',5,5'-Hexachlorobiphenyl/ 2,3',4,4',5',6-Hexachlorobiphenyl
(156/157)	156/157	2,3,3',4,4',5-Hexachlorobiphenyl/ 2,3,3',4,4',5'-Hexachlorobiphenyl
(171/173)	171/173	2,2',3,3',4,4',6-Heptachlorobiphenyl/ 2,2',3,3',4,5,6-Heptachlorobiphenyl
(18/30)	18/30	2,2',5-Trichlorobiphenyl/ 2,4,6-Trichlorobiphenyl
(180/193)	180/193	2,2',3,4,4',5,5'-Heptachlorobiphenyl/ 2,3,3',4',5,5',6- Heptachlorobiphenyl
(183/185)	183/185	2,2',3,4,4',5',6-Heptachlorobiphenyl/ 2,2',3,4,5,5',6-Heptachlorobiphenyl
(197/200)	197/200	2,2',3,3',4,4',6,6'-Octachlorobiphenyl/ 2,2',3,3',4,5,6,6'-Octachlorobiphenyl
(198/199)	198/199	2,2',3,3',4,5,5',6-Octachlorobiphenyl/ 2,2',3,3',4,5,5',6'-Octachlorobiphenyl
(20/28)	20/28	2,3,3'-Trichlorobiphenyl/ 2,4,4'-Trichlorobiphenyl
(21/33)	21/33	2,3,4-Trichlorobiphenyl/ 2,3',4'-Trichlorobiphenyl
(26/29)	26/29	2,3',5-Trichlorobiphenyl/ 2,4,5-Trichlorobiphenyl
(40/41/71)	40/41/71	2,2',3,3'-Tetrachlorobiphenyl/ 2,2',3,4-Tetrachlorobiphenyl/ 2,3',4',6-Tetrachlorobiphenyl
(44/47/65)	44/47/65	2,2',3,5'-Tetrachlorobiphenyl/ 2,2',4,4'-Tetrachlorobiphenyl/ 2,3,5,6-Tetrachlorobiphenyl
(45/51)	45/51	2,2',3,6-Tetrachlorobiphenyl/2,2',4,6'-Tetrachlorobiphenyl
(49/69)	49/69	2,2',4,5'-Tetrachlorobiphenyl/2,3',4,6-Tetrachlorobiphenyl
(50/53)	50/53	2,2',4,6-Tetrachlorobiphenyl/2,2',5,6'-Tetrachlorobiphenyl
(59/62/75)	59/62/75	2,3,3',6-Tetrachlorobiphenyl/2,3,4,6-Tetrachlorobiphenyl/2,4,4',6-Tetrachlorobiphenyl
(61/70/74/76)	61/70/74/76	2,3,4,5-Tetrachlorobiphenyl/2,3',4',5-Tetrachlorobiphenyl/2,4,4',5-Tetrachlorobiphenyl/2,3',4',5'-Tetrachlorobiphenyl
(85/117/116)	85/117/116	2,2',3,4,4'-Pentachlorobiphenyl/ 2,3,4',5,6-Pentachlorobiphenyl/ 2,3,4,5,6-Pentachlorobiphenyl
(86/87/97/108/119/125)	86/87/97/108/119/125	2,2',3,4,5-Pentachlorobiphenyl/ 2,2',3,4,5'-Pentachlorobiphenyl/ 2,2',3,4',5'-Pentachlorobiphenyl/ 2,3',4,4',6-Pentachlorobiphenyl/ 2,3',4,5'-Pentachlorobiphenyl
(88/91)	88/91	2,2',3,4,6-Pentachlorobiphenyl/2,2',3,4',6-Pentachlorobiphenyl
(90/101/113)	90/101/113	2,2',3,4',5-Pentachlorobiphenyl/ 2,2',4,5,5'-Pentachlorobiphenyl/ 2,3,3',5',6-Pentachlorobiphenyl
(93/98/100/102)	93/98/100/102	2,2',3,5,6-Pentachlorobiphenyl/ 2,2',3,4',6'-Pentachlorobiphenyl/ 2,2',4,4',6-Pentachlorobiphenyl/ 2,2',4,5,6'-Pentachlorobiphenyl

## Table X: Common Effects of PCB Exposure Observed in Various Animals Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

System Affected	Specific Effect
Hepatic effects	<ul> <li>Hepatomegaly, bile duct hyperplasia</li> <li>Widespread (e.g., rabbit) or focal (e.g., mouse) necrosis</li> <li>Lipid accumulation, fatty degeneration</li> <li>Induction of microsomal monooxygenases and other enzymes</li> <li>Decreased activity of membrane ATPases</li> <li>Depletion of fat-soluble vitamins</li> <li>Porphyria</li> </ul>
Gastrointestinal effects	<ul> <li>Hyperplasia and hypertrophy of gastric mucosa</li> <li>Gastric ulceration and necrosis</li> <li>Proliferation and invasion of intestinal mucosa (monkey)</li> <li>Hyperplasia, hemorrhage, necrosis (hamster, cow)</li> </ul>
Respiratory effects	· Chronic bronchitis, chronic cough
Nervous system	<ul> <li>Alterations in catecholamine levels</li> <li>Impaired behavioral responses</li> <li>Developmental deficits</li> <li>Depressed spontaneous motor activity</li> <li>Numbness in extremities</li> </ul>
Skin	Chloracne     Edema, alopecia
Immunotoxicity	<ul> <li>Lymphoid involution (spleen, lymph nodes, especially thymus)</li> <li>Subsequent reduction of circulating lymphocytes</li> <li>Suppressed antibody responses</li> <li>Enhances susceptibility to viruses</li> <li>Suppression of natural killer cells</li> </ul>
Endocrine system	<ul> <li>Altered levels of circulating steroids</li> <li>Estrogenic, antiestrogenic, antiandrogenic effects</li> <li>Decreased levels of plasma progesterone</li> <li>Adrenocortical hyperplasia</li> <li>Thyroid pathology, changes in circulating thyroid hormones</li> </ul>
Reproduction	<ul> <li>Increased length of estrus</li> <li>Decreased libido</li> <li>Embryo and fetal effects following in utero exposure</li> </ul>
Carcinogenesis	Promoter     Attenuation of some carcinogens

Source: Hansen 1994

Table . World Health Organization TEFs for mammals, birds, and fish

C	TEF									
Congener	Mammals <sup>1</sup>	Birds <sup>2</sup>	Fish <sup>2</sup>							
Dioxins										
2,3,7,8-TCDD	1	1	1							
1,2,3,7,8-PeCDD	1	1	1							
1,2,3,4,7,8-HxCDD	0.1	0.05	0.5							
1,2,3,6,7,8-HxCDD	0.1	0.01	0.01							
1,2,3,7,8,9-HxCDD	0.1	0.1	0.01							
1,2,3,4,6,7,8-HpCDD	0.01	< 0.001	0.001							
OCDD	0.0003	0.0001	< 0.0001							
Furans										
2,3,7,8-TCDF	0.1	1	0.05							
1,2,3,7,8-PeCDF	0.03	0.1	0.05							
2,3,4,7,8-PeCDF	0.3	1	0.5							
1,2,3,4,7,8-HxCDF	0.1	0.1	0.1							
1,2,3,6,7,8-HxCDF	0.1	0.1	0.1							
1,2,3,7,8,9-HxCDF	0.1	0.1	0.1							
2,3,4,6,7,8-HxCDF	0.1	0.1	0.1							
1,2,3,4,6,7,8-HpCDF	0.01	0.01	0.01							
1,2,3,4,7,8,9-HpCDF	0.01	0.01	0.01							
OCDF	0.0003	0.0001	< 0.0001							
Non-ortho PCBs										
3,3',4,4'-TCB (77)	0.0001	0.05	0.0001							
3,4,4',5-TCB (81)	0.0003	0.1	0.0005							
3,3',4,4',5-PeCB (126)	0.1	0.1	0.005							
3,3',4,4',5,5'-HxCB (169)	0.03	0.001	0.00005							
Mono-ortho PCBs										
2,3,3',4,4'-PeCB (105)	0.00003	0.0001	< 0.000005							
2,3,4,4',5-PeCB (114)	0.00003	0.0001	< 0.000005							
2,3',4,4',5-PeCB (118)	0.00003	0.00001	< 0.000005							
2',3,4,4',5-PeCB (123)	0.00003	0.00001	< 0.000005							
2,3,3',4,4',5-HxCB (156)	0.00003	0.0001	< 0.000005							
2,3,3',4,4',5'-HxCB (157)	0.00003	0.0001	< 0.000005							
2,3',4,4',5,5'-HxCB (167)	0.00003	0.00001	< 0.000005							
2,3,3',4,4',5,5'-HeCB (189)	0.00003	0.00001	< 0.000005							

Source: <sup>1</sup>Van den Berg et al., 2006; <sup>2</sup>Van den Berg et al., 1998.

## Summary of 1997 Tissue Analyses for PCBs (Mean values as mg/Kg wet weight) Cornell-Dubilier Site South Plainfield, NJ

	Station	A-9: Upstream	Referer	ice Area	Station A	A-1: Site Above	Railroad	d Culvert	Station A-2	: Bound Brook	Below C	edar Brook	Station A-3: Bound Brook at Clinton Ave.			
	Aroclor 1254	Aroclor 1248	n	Total PCBs	Aroclor 1254 Aroclor 1248		n	Total PCBs	Aroclor 1254	Aroclor 1248	n	Total PCBs	Aroclor 1254	Aroclor 1248	n	Total PCBs
	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.
Sunfish (Pumpkin Seed) Whole Body	0.4	NA	5	0.4*	3.9	NA	6	3.9*	12.2	NA	5	12.2*	7.7	NA	8	7.7*
Crayfish	<rl< td=""><td>NA</td><td>9</td><td><rl< td=""><td>0.7</td><td>NA</td><td>2</td><td>0.7*</td><td>1.8</td><td>NA</td><td>8</td><td>1.8*</td><td>1.3</td><td>NA</td><td>11</td><td>1.3*</td></rl<></td></rl<>	NA	9	<rl< td=""><td>0.7</td><td>NA</td><td>2</td><td>0.7*</td><td>1.8</td><td>NA</td><td>8</td><td>1.8*</td><td>1.3</td><td>NA</td><td>11</td><td>1.3*</td></rl<>	0.7	NA	2	0.7*	1.8	NA	8	1.8*	1.3	NA	11	1.3*
Fish Fillets:	+															
Carp	0.3	0.1	3	0.4	7.2	1.4	3	8.6	nc	nc	nc	nc	nc	nc	nc	nc
White Sucker	3.2	0.7	3	3.9	3.5	0.8	3	4.3	5.7	2.5	3	8.2	6.5	2.7	3	9.2
Pumpkin Seed	nc	nc	nc	nc	1.9	0.7	3	2.6	3.8	1.6	2	5.4	1.7	0.9	3	2.6
Largemouth Bass	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

	Station A-	4: Bound Brook	upstrea	am of NMP	Stations	A-5 and A-6: N	ew Mar	ket Pond	S	station A-10: Sp	ring Lal	ке
	Aroclor 1254	Aroclor 1248	n	Total PCBs	Aroclor 1254	Aroclor 1248	n	Total PCBs	Aroclor 1254	Aroclor 1248	n	Total PCBs
	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.
Sunfish (Pumpkin Seed) Whole Body	6.3	NA	7	6.3*	4.4	NA	15	4.4*	nc	nc	nc	nc
Camer (Functional Sea)	0.0	10.		0.0								
Crayfish	1.1	NA	4	1.1*	0.8	NA	3	0.8*	nc	nc	nc	nc
Fish Fillets:												
Carp	nc	nc	nc	nc	16.8	6.9	4	23.7	1.1	0.3	3	1.4
White Sucker	nc	nc	nc	nc	9	2.8	3	11.8	0.9	0.15	3	1.05
Pumpkin Seed	1.4	0.7	3	2.1	1.6	0.7	6	2.3	0.1	0.03	2	0.13
Largemouth Bass	nc	nc	nc	nc	1	0.4	6	1.4	0.5	0.04	3	0.54

nc = Organism not collected at this station n = Number of samples analyzed NA = Not Analyzed \* = Total PCBs based on Aroclor 1254 only

PCBs = Polychlorinated Biphenyls mg/Kg w.w. = milligrams per Kiolgram wet weight

### Fish TRVs

	PCI mg PCBs/ NOAEL				Cs s/kg lipid LOAEL	
Pumpkin seed (Lepomis gibbosus)	1.5 0.5	17	TAMS 1999 BERA report based on laboratory studies using minnows TAMS 1999 BERA report based on field studies	0.29	0.6	TAMS 1999 BERA report based on laboratory studies for salmonids
Spottail Shiner (Notropis hudsonius)	15	170	TAMS 1999 BERA report based on laboratory studies	5.4	103	TAMS 1999 BERA report based on laboratory studies
Brown Bullhead (Ictalurus nebulosus)	1.5	17	TAMS 1999 BERA report based on laboratory studies using minnows	8	18	TAMS 1999 BERA report based on laboratory studies for channel catfish eggs

### Table 11. Asiatic Clams Collected at Stations 1, 2, 3, 4, & 5 Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

### Collected 9/25/08 and 10/7/08

	Composite	# of Individuals	Size Range (mm)	Weight (g)
1- ice	1	124	9-21	24.5
Station 1- Reference	2	197	8-20	53.5
Stai Ref	3	64	21-30	50.4
, 2- iii	1	186	12-16	51.2
Station 2- Site/ Landfill	2	79	16-21	53.5
Sta La	3	25	22-29	50.9
n3- int e	1	272	9-18	80.8
Station 3- Adjacent to Site	2	167	19-23	205.4
Sta Ad to	3	170	24-31	203.9
4- 00r t	1	320	9-17	70.0
Station 4- Oakmoor Street	2	82	17-20	49.8
Sta Oa S	3	69	20-27	107.5
5- In	1	67	10-19	54.5
Station 5- Clinton Avenue	2	47	19-24	55.0
Sta Cl Av	3	22	24-32	53.9

All samples analyzed for Aroclors, % Lipids, and % Solids
-Samples selected for PCB Congener Analysis

Table 12. Toxicity Reference Values (TRVs) for Birds and Mammals\*

Cornell-Dubilier Bound Brook Reassessment

South Plainfield, NJ

Analyte	Mam	ımals	Birds			
	NOAEL	LOAEL	NOAEL	LOAEL		
	mg/kg	BW/day	mg/kg (	BW/day		
Polychlorinated Biphenyls						
Total PCBs	0.05	0.1	0.012	0.122		
Total PCBs			0.094	0.94		
Dioxins						
2,3,7,8-TCDD	0.000001	0.00001	0.000014	0.00014		
2,3,7,8-TCDD	0.00004	0.00031				

NA - no studies available

NOAEL - No Observed Adverse Effect Level

LOAEL - Lowest Observed Adverse Effect Level

mg/kg BW/day= milligrams per kilogram body weight per day

2,3,7.8 - TCDD - 2,3,7,8-tetracholor0dibenzo-p-dioxin

<sup>\*</sup> See Appendices D and E for derivation of TRVs to be used for the dietary exposure models For PCBs - If congener-specific TRV was not available, the TRV for total PCBs was used.

Table 13. Descriptive Statistics of Total PCB Concentrations in Fish Tissue per Station and Species

Cornell-Dubilier Bound Brook Reassessment

South Plainfield, NJ

						Fish Tissue	- Whole Bo	ody									
Parameter	Area	Station	Species	Number of Observations	Minimum	Maximum	Mean	Median	Variance	Standard Deviation	Coefficient of Variation	UCL Method Used	95% UCL				
	1	1	Pumpkinseed	5	0.423	0.971	0.66	0.669	0.0568	0.238	0.361	95% Student's-t UCL	0.887				
	1	'	White Sucker	6	0.262	0.74	0.397	0.342	0.0307	0.175	0.441	95% Approximate Gamma UCL	0.573				
ĺ		2	Pumpkinseed	5	4.448	12.92	8.982	8.078	14.33	3.786	0.421	95% Student's-t UCL	12.59				
	2	2	White Sucker	6	18.71	39.22	29.81	30.51	70.88	8.419	0.282	95% Student's-t UCL	36.73				
	2	3	Pumpkinseed	5	20.68	25.83	23.81	24.47	5.053	2.248	0.0944	95% Student's-t UCL	25.96				
		3	White Sucker	8	19.03	59.8	48.09	49.4	176.3	13.28	0.276	95% Student's-t UCL	56.98				
ĺ		4	Pumpkinseed	4	3.394	15.42	9.401	9.396	29.24	5.407	0.575	95% Student's-t UCL	15.76**				
		4	White Sucker	8	2.26	23.75	11.68	10.69	63.88	7.993	0.684	95% Student's-t UCL	17.03				
Total PCBs			Bluegill	3	4.476	8.653	6.334	5.873	4.521	2.126	0.336	95% Student's-t UCL	9.918**				
(mg/kg wet weight)	3		Pumpkinseed	2	6.105	12.96	9.532	9.532	23.48	4.846	0.508	None Computed					
(mg/kg wet weight)		5	Sunfish (Bluegill and Pumkinseed)	5	4.476	12.96	7.613	6.105	11.2	3.347	0.44	95% Student's-t UCL	10.8				
			White Sucker	8	1.398	31.5	13.84	13.23	86.44	9.297	0.672	95% Student's-t UCL	20.06				
ĺ			Bluegill	5	1.76	4.737	3.504	3.542	1.438	1.199	0.342	95% Student's-t UCL	4.647				
	4	6	Carp	8	5.248	33.7	12.88	9.29	91.08	9.543	0.741	95% Approximate Gamma UCL	21.26				
			White Sucker	3	3.777	15.45	9.942	10.59	34.41	5.866	0.59	95% Student's-t UCL	19.83**				
ĺ			Bluegill	5	0.748	2.654	1.431	1.443	0.572	0.757	0.529	95% Student's-t UCL	2.152				
	5	7	Carp	8	0.771	55.01	11.21	3.379	338.6	18.4	1.641	95% Approximate Gamma UCL	35.38				
			White Sucker	3	3.113	10.22	6.068	4.872	13.69	3.7	0.61	95% Student's-t UCL	12.31**				
·																	
	1	1	1	1	1	1	Pumpkinseed	5	8.542	26.33	14.89	13.64	54.24	7.365	0.495	95% Student's-t UCL	21.91
	1	1	White Sucker	6	11.19	24.18	14.69	12.64	23.57	4.855	0.33	95% Approximate Gamma UCL	19.34				
		2	Pumpkinseed	5	179.9	414.6	285.9	264	8295	91.08	0.319	95% Student's-t UCL	372.8				
	0	2	White Sucker	6	1048	2658	1753	1594	300012	547.7	0.312	95% Student's-t UCL	2204				
	2	3	Pumpkinseed	5	519.4	940.2	735.3	753.7	25402	159.4	0.217	95% Student's-t UCL	887.3				
		3	White Sucker	8	983.1	3531	1893	1623	724491	851.2	0.45	95% Student's-t UCL	2463				
		,	Pumpkinseed	4	173.1	447.2	305.6	301	15514	124.6	0.408	95% Student's-t UCL	452.2**				
		4	White Sucker	8	276.4	952.6	552.7	525.8	37226	192.9	0.349	95% Student's-t UCL	681.9				
Total PCBs			Bluegill	3	166.7	241.5	197.4	183.9	1534	39.17	0.198	95% Student's-t UCL	263.4**				
(% Lipids)	3		Pumpkinseed	2	241.5	453.8	347.7	347.7	22525	150.1	0.432	None Computed					
(70 Lipido)		5	Sunfish (Bluegill and Pumkinseed)	5	166.7	453.8	257.5	241.5	13173	114.8	0.446	95% Student's-t UCL	366.9				
			White Sucker	8	33.07	830.2	443.6	387.8	69746	264.1	0.595	95% Student's-t UCL	620.5				
			Bluegill	5	110.7	191.7	153.5	157.7	955	30.9	0.201	95% Student's-t UCL	182.9				
	4	6	Carp	8	101.7	359.1	175.9	137.4	8251	90.84	0.516	95% Approximate Gamma UCL	248.8				
			White Sucker	3	126.4	1055	558.4	493.8	218715	467.7	0.838	95% Student's-t UCL	1347**				
			Bluegill	5	23.28	98.12	54.02	51.24	917.3	30.29	0.561	95% Student's-t UCL	82.9				
	5	7	Carp	8	8.551	454.9	122.5	54.95	23682	153.9	1.257	95% Approximate Gamma UCL	343.5				
			White Sucker	3	61.69	226.9	170.9	224.2	8949	94.6	0.554	95% Chebyshev (Mean, Sd) UCL	409**				

% - percent

mg/kg - milligrams per kilogram

UCL - upper confidence limit about the mean

 $\ensuremath{^{**}}$  - indicates computed UCL exceeds maximum value

Note:

95% UCLs computed and recommended by ProUCL version 4.0 software.

A potential outlier was identified for White Suckers in Station 1. Dixon's outlier test was run using ProUCL to statistically evaluate the data and to determine

if there was statistical evidence that the data point was indeed an outlier. Dixon's test confirmed it as an outlier with associated 99% confidence.

One white sucker sample collected at Station 1 was statistically identified as an outlier (See Appendix \_\_) and was deleted from the statistical calculations.

Table 14. Toxicity Equivalency Concnetrations (TEC) of Dioxin-like PCB Congeners in Fish Samples

					Fish	n TEF	Man	ımal TEF	Bird	TEF					Fish	TEC	Mamn	nal TEC	Biro	I TEC			
Sample	Fillet Weight (g)	Carcass Weight (g)	Fillet % Lipids (mg/kg ww)	Carcass % Lipids (mg/kg ww)	Fillet Dioxin-like Congener Total with Fish TEF factor (mg/kg)	Carcass Dioxin-like Congener Total with Fish TEF factor (mg/kg)	Congener Total with Mammal	like Congener	Fillet Dioxin- like Congener Total with Bird TEF factor (mg/kg)	like Congener	Fillet PCB Congener Total (mg/kg)	Carcass PCB Congener Total (mg/kg)	of Aroclors 1248, 1254, and 1260	Carcass Total of Aroclors 1248, 1254, and 1260 (mg/kg ww)	Whole Body Concentration for Dioxin-like Congeners (mg/kg) wet weight for Fish	Whole Body Concentration for Dioxin-like Congeners (ng/kg) wet weight for Fish	Whole Body Concentration for Dioxin-like Congeners (mg/kg) wet weight for Mammals	Whole Body Concentration for Dioxin-like Congeners (ng/kg) wet weight for Mammals	Whole Body Concentration for Dioxin-like Congeners (mg/kg) wet weight for Birds	Whole Body Concentration for Dioxin-like Congeners (ng/kg) wet weight for Birds	Whole Body Concentration for Total PCBs using Congeners (mg/kg) wet weight	Whole Body Concentration for Total PCBs using <b>Aroclors</b> (mg/kg) wet weight	
1-WS-5	26.59	109.79	0.97	3.0	4.456E-07	4.869E-07	8.10808E-06	7.714E-06	1.424E-05	2.380E-05	0.123	0.406	0.108	0.336	4.788E-07	0.479	7.791E-06	7.791	2.194E-05	21.936	0.351	0.292	11.187
1-P-2	40.74	193.89	2.4	5.6	1.744E-07	6.171E-07	2.90091E-06	1.022E-05	9.664E-06	3.548E-05	0.162	0.543	0.238	0.471	5.402E-07	0.540	8.946E-06	8.946	3.100E-05	30.998	0.477	0.431	8.672
2-WS-2	23.47	114.65	1.40	1.8	4.789E-05	2.075E-05	0.000822267	2.813E-04	1.048E-03	6.016E-04	14.2	18.1	20.3	28.5	2.536E-05	25.363	3.733E-04	373.253	6.775E-04	677.462	17.437	27.107	1560.677
2-WS-6	15.25	75.72	0.83	1.1	3.039E-05	1.852E-05	0.000489407	1.903E-04	6.156E-04	5.116E-04	10.8	22.8	8.6	25	2.051E-05	20.508	2.404E-04	240.408	5.291E-04	529.076	20.788	22.251	2065.429
2-P-3	40.90	199.36	0.78	2.7	1.419E-06	4.191E-06	2.12773E-05	5.160E-05	5.413E-05	1.997E-04	1.13	4.85	0.976	5.16	3.719E-06	3.719	4.644E-05	46.441	1.749E-04	174.911	4.217	4.448	179.879
3-WS-3	69.98	286.34	1.10	3.2	1.354E-05	4.348E-05	0.000194342	6.990E-04	4.180E-04	1.425E-03	9.26	25.5	10.6	60.7	3.760E-05	37.600	5.999E-04	599.869	1.228E-03	1227.617	22.311	50.861	1713.590
3-P-3	39.05	221.94	0.84	3.4	8.465E-06	1.674E-05	0.000133511	2.070E-04	2.277E-04	6.044E-04	4.03	17.8	3.83	29.7	1.551E-05	15.505	1.960E-04	195.987	5.480E-04	547.999	15.740	25.829	811.050
4-WS-5	15.73	72.19	0.53	1.4	3.996E-06	5.372E-06	6.43472E-05	6.574E-05	1.140E-04	1.972E-04	2.37	6.22	2.3	7.46	5.126E-06	5.126	6.549E-05	65.488	1.824E-04	182.361	5.531	6.537	515.164
4-P-3	49.29	208.26	0.67	1.6	1.724E-06	4.733E-06	2.70065E-05	6.200E-05	6.007E-05	2.188E-04	1.24	5.19	1.34	3.88	4.157E-06	4.157	5.531E-05	55.306	1.884E-04	188.439	4.434	3.394	234.366
5-WS-4	60.97	241.2	0.96	2.7	4.781E-06	1.011E-05	7.57642E-05	1.306E-04	1.583E-04	4.728E-04	3.24	11.7	3.77	25.4	9.031E-06	9.031	1.196E-04	119.568	4.093E-04	409.325	9.993	21.036	830.162
5-P-2	63.43	321.78	0.86	2.8	1.840E-06	5.458E-06	2.46049E-05	7.321E-05	6.476E-05	2.098E-04	1.73	5.72	1.77	6.96	4.862E-06	4.862	6.520E-05	65.205	1.859E-04	185.946	5.063	6.105	241.531
5-BG-3	55.54	284.46	0.83	3.0	1.139E-06	4.640E-06	1.49951E-05	6.670E-05	5.140E-05	1.888E-04	1.23	4.34	1.23	5.11	4.068E-06	4.068	5.826E-05	58.256	1.663E-04	166.325	3.832	4.476	166.717
6-WS-2	48.53	299.2	1.10	2.3	5.947E-06	9.056E-06	8.68643E-05	1.135E-04	1.641E-04	3.210E-04	3.77	9.22	5.01	11.5	8.622E-06	8.622	1.098E-04	109.780	2.991E-04	299.066	8.459	10.594	493.783
6-C-3	354.06	2494.75	4.20	10.1	1.447E-05	2.570E-05	0.000209186	3.964E-04	3.249E-04	6.130E-04	156	24.8	14.7	36.4	2.430E-05	24.301	3.731E-04	373.104	5.772E-04	577.153	41.106	33.703	359.104
6-BG-2	62.63	293.43	0.72	2.9	6.744E-07	4.061E-06	8.46933E-06	5.444E-05	2.927E-05	1.685E-04	0.763	4.32	0.839	5.25	3.465E-06	3.465	4.636E-05	46.357	1.440E-04	144.025	3.694	4.474	169.688
7-WS-2	73.91	348.65	1.30	2.3	2.864E-06	3.574E-06	4.43746E-05	4.307E-05	9.258E-05	1.712E-04	2.28	5.03	2.57	5.36	3.449E-06	3.449	4.329E-05	43.295	1.574E-04	157.442	4.549	4.872	226.860
7-C-6	261.46	3401.93	3.70	5.5	1.113E-06	1.246E-06	1.68754E-05	1.877E-05	2.824E-05	3.059E-05	0.785	0.939	0.83	1.16	1.236E-06	1.236	1.864E-05	18.636	3.042E-05	30.423	0.928	1.136	21.187
7-BG-2	54.17	237.06	0.74	3.2	1.605E-07	1.726E-06	1.85839E-06	2.183E-05	7.639E-06	7.220E-05	0.16	1.44	0.318	1.7	1.435E-06	1.435	1.811E-05	18.114	6.019E-05	60.190	1.202	1.443	51.237

U- Not detected

I- Value
N- Presumptively present
UJ- Not detected and reporting limit is estimated

TEC = toxicity equivalency concentration

mg/kg ww -milligrams per kilogram wet weight

## Table 15. Aroclors and Total PCB Accumulations in Asiatic Clams (mg/kg ww) Cornell-Dublier Bound Brook Reassessment South Plainfield, NJ

	Replicate	# of Individuals	Size Range (mm)	Mass (g)	% Solids	% Lipids	Aroclor 1248 (mg/kg ww)	Aroclor 1254 (mg/kg ww)	Aroclor 1260 (mg/kg ww)	Total PCBs (mg/kg ww)	Whole Body Concentration as % Lipids
1- ce	1	124	9-21	24.5	8.6	0.86	U	U	U	U	n/a
Station 1- Reference	2	197	8-20	53.5	9.6	0.82	U	0.062	U	0.0618	8
Sta Ref	3	64	21-30	50.4	9.9	0.89	U	0.112	U	0.112	13
, 2- i≡	1	186	12-16	51.2	10	0.7	0.591	1.290	U	1.880	269
Station 2 Site/ Landfill	2	79	16-21	53.5	9.8	0.8	0.985	2.050	U	3.040	380
Sta S La	3	25	22-29	50.9	9.6	0.86	0.932	2.170	U	3.110	362
13- ent e	1	272	9-18	80.8	8.6	0.56	0.556	1.400	U	1.960	350
Station 3- Adjacent to Site	2	167	19-23	205	8.1	0.76	1.00	2.760	U	3.760	495
Stati Adja to	3	170	24-31	204	7	0.54	0.601	1.540	0.107	2.250	417
. or	1	320	9-17	70	11	1.1	0.926	1.640	U	2.560	233
Station 4- Oakmoor Street	2	82	17-20	49.8	11	0.72	0.836	1.580	U	2.410	335
Sta Oa Si	3	69	20-27	108	8.4	0.56	0.612	1.270	U	1.880	336
5- n	1	67	10-19	54.5	8.4	0.65	0.892	1.660	U	2.550	392
Station 5 Clinton Avenue	2	47	19-24	55	9.6	1.1	1.16	2.250	U	3.410	310
Sti. C	3	22	24-32	53.9	8	0.74	1.09	2.040	U	3.120	422

mg/kg ww -milligrams per kilogram wet weight MS/MSD - matrix spike/ matrix spike duplicate U - undetected

Table 16. Descriptive Statistics of Total PCB Concentrations in Asiatic Clam Tissue per Station Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

			Asiatic Cla	m Tissue				
Parameter	Station	Number of Observations	Minimum	Maximum	Mean	Median	Standard Deviation	Coefficient of Variation
	1	3 (including 1 ND)	0.0618	0.112	0.0869	0.0869	0.0355	0.408
	2	3	1.88	3.11	2.677	3.04	0.691	0.258
Total PCBs (mg/kg wet weight)	3	3	1.96	3.76	2.657	2.25	0.966	0.364
(g,g	4	3	1.88	2.56	2.283	2.41	0.357	0.156
	5	3	2.55	3.41	3.027	3.12	0.438	0.145
	1	2	7.537	12.58	10.06	10.06	3.569	0.355
	2	3	268.6	380	336.7	361.6	59.74	0.177
Total PCBs (% Lipids)	3	3	350	494.7	420.5	416.7	72.44	0.172
(70 = 151.00)	4	3	232.7	335.7	301.1	334.7	59.18	0.197
	5	3	310	421.6	374.6	392.3	57.87	0.154

mg/kg - milligrams per kilogram

ND - non-detect; concentration is below the reporting limit

Table 17. Descriptive Statistics of Total PCB Concentrations in Asiatic Clam Tissue per Area
Cornell-Dubilier Bound Brook Reassessment
South Plainfield, NJ

	Asiatic Clam Tissue											
Parameter	Station(s)	Number of Observations	Minimum	Maximum	Mean	Median	Standard Deviation	Coefficient of Variation				
	1	3 (including 1 ND)	0.0618	0.112	0.0869	0.0869	0.0355	0.408				
Total PCBs (mg/kg wet weight)	2 & 3	6	1.88	3.76	2.667	2.645	0.751	0.282				
(g,gee.g)	4 & 5	6	1.88	3.41	2.655	2.555	0.542	0.204				
	1	2	7.537	12.58	10.06	10.06	3.569	0.355				
Total PCBs (% Lipids)	2 & 3	6	268.6	494.7	378.6	370.8	75.03	0.198				
(/3 =/p/33)	4 & 5	6	232.7	421.6	337.8	335.2	66.07	0.196				

mg/kg - milligrams per kilogram

 $\ensuremath{\mathsf{ND}}\xspace$  - non-detect; concentration is below the reporting limit

# Table 18. Summary of TEC Concentrations for Birds and Mammals Based on Invertebrate (Asiatic Clam) Tissues Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

### **TEC Concentrations for Birds**

### **TEC Concentrations for Mammals**

			Dioxin-like Congeners	
	Dioxin-like Congeners	Dioxin-like Congeners	mg/kg w.w. for	Dioxin-like Congeners
Asiatic Clam	mg/kg w.w. for Birds	ng/kg w.w. for Birds	Mammals based on	ng/kg w.w. for Mammals
Samples	based on Clam Tissue	based on Clam Tissue	Clam Tissue	based on Clam Tissue
Station 1-AC-3	1.08054E-05	10.81	3.05461E-06	3.05
Station 2-AC-3	4.15816E-05	41.58	1.73929E-05	17.39
Station 3-AC-3	9.56506E-05	95.65	2.29032E-05	22.90
Station 4-AC-3	4.24784E-05	42.48	1.05114E-05	10.51
Station 5-AC-3	1.39E-04	138.84	3.27586E-05	32.76

AC = Asiatic clam

mg/kg w.w. = milligram per kilogram wet weight ng/kg w.w.= nanogram per kilogram wet weight

TEC = toxicity equivalency concentration

### Table 19. Descriptive Statistics of Total PCB Concentrations in Fish Tissue Per Area with Species Combined Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

					ı	Fish Tissue - V	Vhole Body					
Parameter	Area	Station(s)	Number of Observations	Minimum	Maximum	Mean	Median	Variance	Standard Deviation	Coefficient of Variation	UCL Method Used	95% UCL
	1	1	11	0.262	0.971	0.517	0.423	0.0569	0.239	0.462	95% Student's-t UCL	0.647
Total PCBs	2	2&3	24	4.448	59.8	30.31	25.79	290.5	17.04	0.562	95% Student's-t UCL	36.28
(mg/kg wet weight)	3	4&5	25	1.398	31.5	11.19	8.653	54.98	7.415	0.663	95% Approximate Gamma UCL	14.34
	4	6	16	1.76	33.7	9.399	6.176	65.58	8.098	0.862	95% Approximate Gamma UCL	13.48
	5	7	16	0.748	55.01	7.191	2.199	179.9	13.41	1.865	95% Approximate Gamma UCL	13.53
	1	1	11	8.542	26.33	14.78	12.91	33.49	5.787	0.392	95% Student's-t UCL	17.94
	2	2&3	24	179.9	3531	1282	1154	760013	871.8	0.68	95% Student's-t UCL	1587
Total PCBs (% Lipids)	3	4&5	25	33.07	952.6	419.2	428.4	49071	221.5	0.528	95% Student's-t UCL	495
	4	6	16	101.7	1055	240.6	148.7	58231	241.3	1.003	95% Chebyshev (Mean, Sd) UCL	503.6
	5	7	16	8.551	454.9	110.2	64.67	14359	119.8	1.088	95% Approximate Gamma UCL	183.5

% - percent

mg/kg - milligrams per kilogram

UCL - upper confidence limit about the mean

Note:

95% UCLs computed and recommended by ProUCL version 4.0 software.

One white sucker sample collected at Station 1 was statistically identified as an outlier (See Appendix \_\_) and was deleted from the statistical calculations.

### Table 20: Summary of Food Chain Models Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

		Model 1	Model 2	Representative
Receptors	Site-Specific Food Source	Conservative Life History Parameters	Life History Para	ameters
Piscivores				
Kingfisher	Fish collected from Areas 1 to 5			
Green Heron	Fish collected from Areas 1 to 5	1) Used 95% UCL PCB concentrations for fish tissue	1) Used Mean PCB concentration	is for fish tissue
Great Blue Heron	Fish collected from Areas 1 to 5	2) Used Maximum TEC concentrations for fish tissue	2) Used Maximum TEC concentra	ations for fish tissue
Mink	Fish collected from Areas 1 to 5	3) Used Maximum PCB concentrations for clam tissue	3) Used Mean PCB concentration	is for clam tissue
		4) Used Maximum TEC concentrations for clam tissue	4) Used Maximum TEC concentra	ations for clam tissue
Invertivores:		5) AUF of 1.0	5) AUF of 1.0	
Red-winged Blackbird	Asiatic clams collected from Areas 1, 2, and 3			
Bank Swallow	Asiatic clams collected from Areas 1, 2, and 3			
Raccoon	Asiatic clams collected from Areas 1, 2, and 3			
Little Brown Bat	Asiatic clams collected from Areas 1, 2, and 3			
Omnivores:				
Mallard	Fish and Asiatic clams collected from Areas 1, 2, and 3			
Raccoon	Fish and Asiatic clams collected from Areas 1, 2, and 3			

AUF - Area Use Factor

PCB - Polychlorintaed biphenyls

TEC - Toxicity Equivalency Concentration for the 12 dioxin-like PCBs

95% UCL - 95 % Upper Confidence Level

Table 21. Life History Exposure Parameters for Food Chain Model Receptor Species Cornell Dubilier Bound Brook Reassessment South Plainfield, NJ

Receptor	Scenario	Body Weight	Food Ingestion	Home Range	Assumed Dieta	ary Composition (%
		(kg)	(kg/day ww)	(ha)	fish	invertebrate
Kingfisher	Conservative	0.1043	0.10073	389.3 m	100	0
	Representative	0.1493	0.0573	2485 m	100	0
Great Blue Heror	Conservative	1.905	0.4762	0.6	100	0
	Representative	2.505	0.30848	4.5	100	0
Green Heron	Conservative	0.27	0.06988	3.3	100	0
	Representative	0.22	0.058402	2.03	100	0
Mink	Conservative	0.454	0.408313	7.7	100	0
	Representative	1.02	0.228615	938	100	0
Red-winged	Conservative	0.029	0.015753	0.005	0	100
Blackbird	Representative	0.0579	0.007908	0.331	0	100
Bank Swallow	Conservative	0.0099	0.007843	3256	0	100
	Representative	0.014	0.01041965	5628	0	100
Raccoon	Conservative	2.2	0.3624	4.71	0	100
	Representative	6.55	0.3574	103.6	0	100
Little Brown	Conservative	0.005			0	100
Bat	Representative	0.00802			0	100
Mallard	Conservative	0.55	0.071	3.9	50	50
	Representative	1.14	0.164	216	50	50
Raccoon	Conservative	2.2	0.3624	4.71	50	50
	Representative	6.55	0.3574	133.3	50	50

kg = kilograms

kg/day ww = kilograms per day wet weight

ha = hectares

% = percent

See Appendix L for Life History Profiles

### Table 22. Summary of Hazard Quotients (HQs) for Piscivorous Birds Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

Receptor: Kingfisher

	Area 1 Upstream Reference Area		Area 2 Adjacent to Cornell-Dubilier Site		Area 3  Downstream of  Cornell-Dubilier Site		Area 4 New Market Pond		Area 5 Spring Lake	
	PCBs	TEC	PCBs	TEC	PCBs	TEC	PCBs	TEC	PCBs	TEC
Model 1										
LOAEL HQ	0.7	0.2	37.3	8.5	14.8	2.8	13.9	4.0	13.9	1.1
NOAEL HQ	6.7	2.1	373.4	84.8	147.6	28.3	138.7	39.9	139.2	10.9
Model 2										
LOAEL HQ	0.2	0.08	12.8	3.4	4.6	1.1	3.8	1.6	2.9	0.4
NOAEL HQ	2.1	0.85	128.1	33.7	45.8	11.2	38.4	15.9	29.4	4.3

Receptor: Green Heron

	Area 1 Upstream Reference Area		Area 2 Adjacent to Cornell-Dubilier Site		Area 3  Downstream of  Cornell-Dubilier Site		Area 4 New Market Pond		Area 5 Spring Lake	
	PCBs	TEC	PCBs	TEC	PCBs	TEC	PCBs	TEC	PCBs	TEC
Model 1										
LOAEL HQ	0.2	0.06	10.0	2.3	4.0	0.8	3.7	1.1	3.7	0.3
NOAEL HQ	1.8	0.6	100.1	22.7	39.6	7.6	37.2	10.7	37.3	2.9
Model 2										
LOAEL HQ	0.15	0.06	8.9	2.3	2.6	0.6	2.2	1.1	1.7	0.3
NOAEL HQ	1.5	0.6	88.6	23.3	25.8	6.3	21.6	11.0	16.6	3.0

Receptor: Great Blue Heror

	Area 1 Upstream Reference Area		Area 2 Adjacent to Cornell-Dubilier Site		Area 3  Downstream of  Cornell-Dubilier Site		Area 4 New Market Pond		Area 5 Spring Lake	
	PCBs	TEC	PCBs	TEC	PCBs	TEC	PCBs	TEC	PCBs	TEC
Model 1										
LOAEL HQ	0.2	0.06	9.7	2.2	3.8	0.7	3.6	1.03	3.6	0.3
NOAEL HQ	1.7	0.6	96.6	22.0	38.2	7.3	36.0	10.3	36.0	2.8
Model 2										
LOAEL HQ	0.07	0.03	4.1	1.1	1.5	0.4	1.2	0.5	0.9	0.1
NOAEL HQ	0.7	0.3	41.1	10.8	14.7	3.6	12.3	5.1	9.4	1.4

HQ less than 1.0 HQ between 1.0 and 10 HQ greater than 10

PCBs = Polychlorinated Biphenyls

TEC = Toxicity Equivalency Concentration for Dioxin-like PCBs

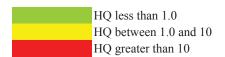
HQ = Hazard Quotient

LOAEL = Lowest Observable Adverse Effect Level

## Table 23. Summary of Hazard Quotients (HQs) for Piscivorous Mammals Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

Receptor: Mink

			Are	ea 2	Are	ea 3					
	Are	ea 1	Adjac	ent to	Downst	ream of	Are	ea 4	Are	ea 5	
	Upstream Re	Upstream Reference Area		Cornell-Dubilier Site		Cornell-Dubilier Site		New Market Pond		Spring Lake	
	PCBs	TEC	PCBs	TEC	PCBs	TEC	PCBs	TEC	PCBs	TEC	
Model 1											
LOAEL HQ	5.8	< 0.01	326.8	1.7	129.2	0.3	121.4	1.1	121.9	0.1	
NOAEL HQ	11.7	0.2	653.7	13.5	258.4	2.7	242.9	8.4	243.8	1.0	
Model 2											
LOAEL HQ	1.2	0.01	69.2	0.4	25.6	0.09	21.5	0.3	16.4	0.03	
NOAEL HQ	2.4	0.05	138.5	3.4	51.1	0.7	42.9	2.1	32.9	0.3	
Model 3											
Low Acute TRV	0.5	ND	29.7	ND	11.7	ND	11.0	ND	11.1	ND	
High Acute TRV	0.2	ND	9.9	ND	3.9	ND	3.7	ND	3.7	ND	
Model 4											
Low Acute TRV	0.11	ND	6.29	ND	2.32	ND	1.95	ND	1.49	ND	
High Acute TRV	0.04	ND	2.1	ND	0.77	ND	0.65	ND	0.5	ND	



PCBs = Polychlorinated Biphenyls

TEC = Toxicity Equivalency Concentration for Dioxin-like PCBs

HQ = Hazard Quotient

 $LOAEL = Lowest\ Observable\ Adverse\ Effect\ Level$ 

NOAEL = No Observable Adverse Effect Level

TRV = Toxicity Reference Value

ND = Not Determined

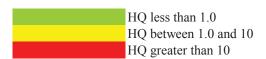
### Table 24. Summary of Hazard Quotients (HQs) for Insectivorous Birds Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

Receptor: Red-winged Blackbird

		ea 1 eference Area	Adja	rea 2 cent to Oubilier Site	Area 3  Downstream of  Cornell-Dubilier Site		
	PCBs TEC		PCBs	PCBs TEC		TEC	
Model 1							
LOAEL HQ	0.05	0.03	1.79	0.31	1.63	0.44	
NOAEL HQ	0.53	0.35	17.92	3.06	16.26	4.44	
Model 2							
LOAEL HQ							
NOAEL HQ							

Receptor: Bank Swallow

	Area 1 Upstream Reference Area		Adjac	ea 2 cent to ubilier Site	Area 3  Downstream of  Cornell-Dubilier Site		
	PCBs TEC		PCBs TEC		PCBs	TEC	
Model 1							
LOAEL HQ	0.1	0.06	3.31	0.57	3.0	0.82	
NOAEL HQ	0.99	0.64	33.13	5.66	30.05	8.21	
Model 2							
LOAEL HQ	0.07	0.06	2.13	0.51	2.12	0.74	
NOAEL HQ	0.69	0.58	21.3	5.12	21.22	7.44	



PCBs = Polychlorinated Biphenyls

TEC = Toxicity Equivalency Concentration for Dioxin-like PCBs

HQ = Hazard Quotient

LOAEL = Lowest Observable Adverse Effect Level

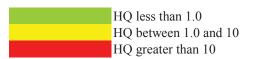
Table 25. Summary of Hazard Quotients (HQs) for Invertivorous Mammals Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

Receptor: Raccoon

	Are Upstream Re	ea 1 eference Area		ea 2 nell-Dubilier Site	Area 3 Downstream of Cornell-Dubilier Site		
	PCBs	TEC	PCBs	TEC	PCBs	TEC	
Model 1							
LOAEL HQ	0.2	0.0	6.84	0.01	6.2	0.02	
NOAEL HQ	0.41	0.01	13.67	0.1	12.4	0.15	
Model 2							
LOAEL HQ	0.05	0.0	1.51	0.0	1.5	0.01	
NOAEL HQ	0.1	0.0	3.02	0.03	3.01	0.05	

Receptor: Little Brown Bat

	Are Upstream Re	ea 1 ference Area		ea 2 nell-Dubilier Site	Area 3 Downstream of Cornell-Dubilier Site			
	PCBs TEC		PCBs	TEC	PCBs	TEC		
Model 1								
LOAEL HQ	0.48	0.0	16.05	0.03	14.56	0.05		
NOAEL HQ	0.96	0.03	32.11	0.24	29.12	0.35		
Model 2								
LOAEL HQ	0.18	0.0	5.4	0.01	5.38	0.02		
NOAEL HQ	0.35	0.02	10.8	0.12	10.76	0.17		



PCBs = Polychlorinated Biphenyls

TEC = Toxicity Equivalency Concentration for Dioxin-like PCBs

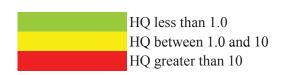
HQ = Hazard Quotient

LOAEL = Lowest Observable Adverse Effect Level

### Table 26. Summary of Hazard Quotients (HQs) for Omnivorous Birds Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

Receptor: Mallard

					Area 3				
	Are	a 1	Are	ea 2	Downstream of				
	Upstream Re	ference Area	Adjacent to Cor	nell-Dubilier Site	Cornell-Dubilier Site				
	PCBs	TEC	PCBs	TEC	PCBs	TEC			
Model 1									
LOAEL HQ	0.16	0.06	8.36	1.86	3.71	0.77			
NOAEL HQ	1.59	0.58	83.64	18.56	37.08	7.69			
Model 2									
LOAEL HQ	0.05	0.02	2.68	0.7	1.09	0.29			
NOAEL HQ	0.48	0.22	26.79	7.01	10.92	2.9			



PCBs = Polychlorinated Biphenyls

TEC = Toxicity Equivalency Concentration for Dioxin-like PCBs

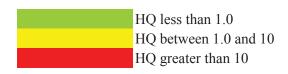
HQ = Hazard Quotient

LOAEL = Lowest Observable Adverse Effect Level

# Table 27. Summary of Hazard Quotients (HQs) for Omnivorous Mammals Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

Receptor: Raccoon

	Area 1	Upstream	Area 2	Adjacent	Area 3				
	Referen	ce Area	to Cornell-I	Oubilier Site	Downstream of Cornell-Dubilier Site				
	PCBs	TEC	PCBs	TEC	PCBs	TEC			
Model 1									
LOAEL HQ	0.69	0.0	36.4	0.18	16.14	0.04			
NOAEL HQ	1.38	0.03	72.8	1.42	32.27	0.35			
Model 2									
LOAEL HQ	0.17	0.0	9.6	0.0	3.9	0.0			
NOAEL HQ	0.34	0.0	19.2	0.02	7.8	0.02			



PCBs = Polychlorinated Biphenyls

TEC = Toxicity Equivalency Concentration for Dioxin-like PCBs

HQ = Hazard Quotient

LOAEL = Lowest Observable Adverse Effect Level

#### Table . Risk Description Summary of Assessment Endpoints 2 through 7 for Areas 1 to 5 Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

Exposure Scenario	Exposure Type	Predicted Risk	Area 1- Upstream Reference Area		Area 2 - Adjacent to	Cornell-Dubilier Site	Area 3 - Downstream	of Cornell-Dubilier Site	Area 4 - New	Market Pond	Area 5 - Spring Lake		
Piscivorous Birds and Mammal	s, Assessment Endpoints #	2 and # 3	Birds	Mammals	Birds	Mammals	Birds	Mammals	Birds	Mammals	Birds	Mammals	
Conservative, Model 1	Fish	At Risk		PCB	PCB, TEC	PCB, TEC	PCB, TEC	PCB	PCB, TEC	PCB	PCB, TEC	PCB	
		Possible Risk	PCB, TEC							TEC			
Representative, Model 2	Fish	At Risk		PCB	PCB, TEC	PCB	PCB, TEC	PCB	PCB, TEC	PCB	PCB	PCB	
		Possible Risk	PCB			TEC				TEC	TEC		
Invertivorous Birds and Mammals, Assessment Endpoints # 4 and # 5		Birds	Mammals	Birds	Mammals	Birds	Mammals	Birds	Mammals	Birds	Mammals		
Conservative, Model 1	Invertebrates	At Risk							nd	nd	nd	nd	
		Possible Risk											
Representative, Model 2	Invertebrates	At Risk							nd	nd	nd	nd	
		Possible Risk											
Omnivorous Birds and Mamma	lls, Assessment Endpoints	# 6 and # 7	Birds	Mammals	Birds	Mammals	Birds	Mammals	Birds	Mammals	Birds	Mammals	
Conservative, Model 1	Fish+Invertebrates	At Risk			PCB	PCB	PCB	PCB	nd	nd	nd	nd	
		Possible Risk			TEC		TEC					_	
Representative, Model 2	Fish+Invertebrates	At Risk			PCB	PCB	PCB	PCB	nd	nd	nd	nd	
		Possible Risk			TEC		TEC						

PCBs = Polychlorinated Biphenyl TEC = Toxicity Equivalency Concentration Blank cell indicates that no model-calculated risk was identified. LOAEL = Lowest Observable Adverse Effects Level

COPCs identified "At Risk" were based on model-calculated risk in which the HQs exceeded 1.0 for both the NOAEL-based and the LOAEL-based HQs.

COPCs identified as "Possible Risk" indicates that it cannot be concluded there is no model-caculated risk in which the HQs exceeded 1.0 for the NOAEL-based HQ but not the LOAEL-based HQ.

nd = not determined

Models 1 and 2 are described in Figures ?????. Tables ...???. summarize the food chain modeling for each receptor at each AOI.

LOAEL = Lowest Observable Adverse Effects Level NOAEL = No Observable Adverse Effects Level

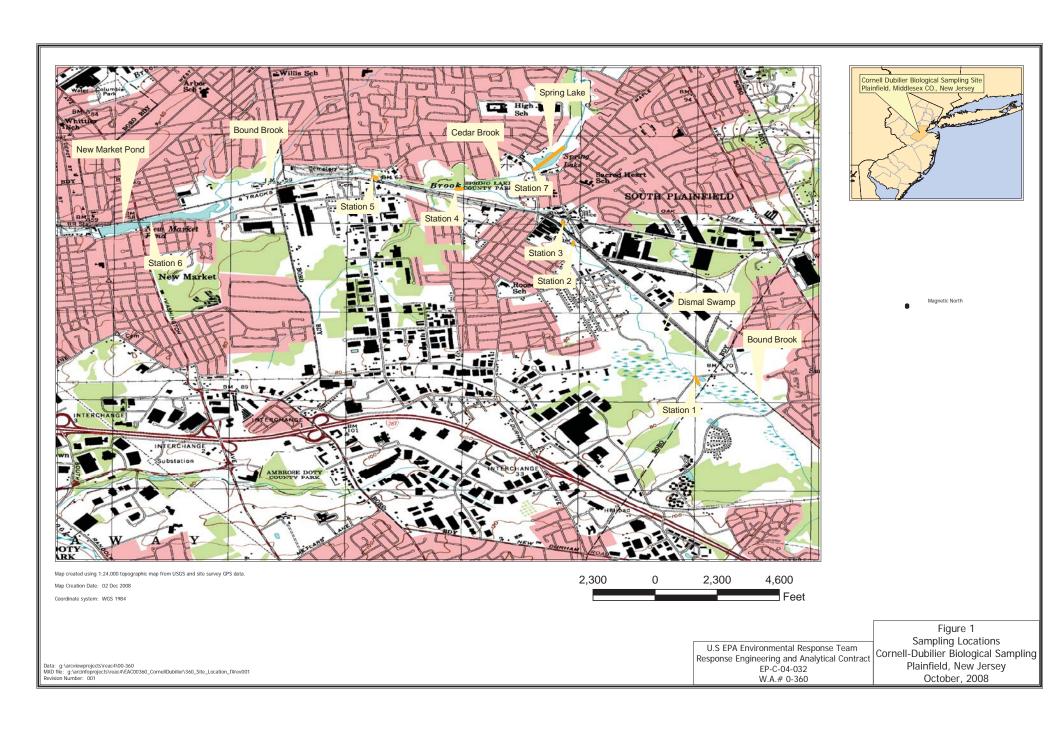
Table 28. Summary of 1997 Fish Tissue Analyses (EPA 1999) for PCBs (Mean values as mg/Kg wet weight)
Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

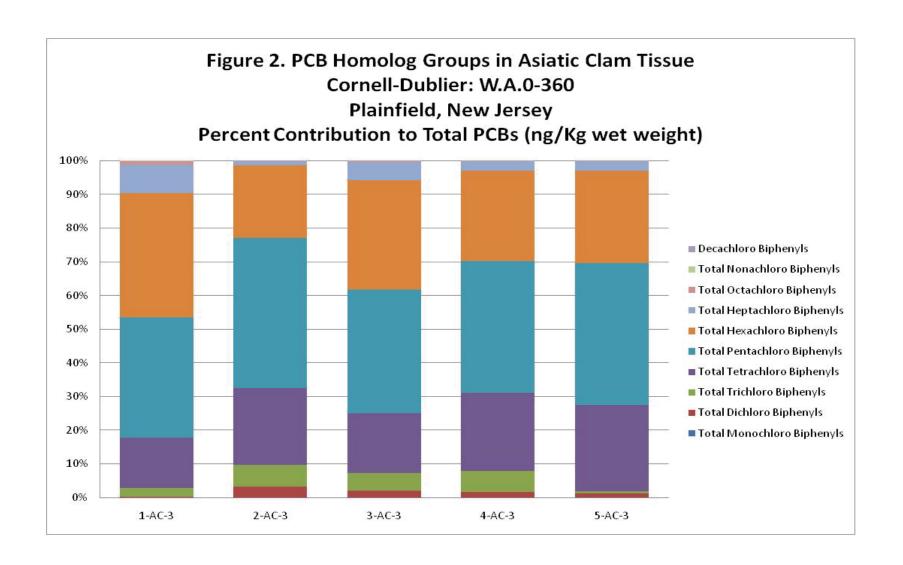
	Station	A-9: Upstream	nce Area	Station A-1: Site Above Railroad Culvert				Station A-2: Bound Brook Below Cedar Brook				Station A-3: Bound Brook at Clinton Ave.				
	Aroclor 1254	Aroclor 1248	n	Total PCBs	Aroclor 1254	clor 1254 Aroclor 1248		Total PCBs	Aroclor 1254	Aroclor 1248	Aroclor 1248 n		Aroclor 1254 Aroclor 1248		n	Total PCBs
	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.
Sunfish (Pumpkinseed) Whole Body	0.4	NA	5	0.4*	3.9	NA	6	3.9*	12.2	NA	5	12.2*	7.7	NA	8	7.7*
Crayfish	<rl< td=""><td>NA</td><td>9</td><td><rl< td=""><td>0.7</td><td>NA</td><td>2</td><td>0.7*</td><td>1.8</td><td>NA</td><td>8</td><td>1.8*</td><td>1.3</td><td>NA</td><td>11</td><td>1.3*</td></rl<></td></rl<>	NA	9	<rl< td=""><td>0.7</td><td>NA</td><td>2</td><td>0.7*</td><td>1.8</td><td>NA</td><td>8</td><td>1.8*</td><td>1.3</td><td>NA</td><td>11</td><td>1.3*</td></rl<>	0.7	NA	2	0.7*	1.8	NA	8	1.8*	1.3	NA	11	1.3*
Fish Fillets:																
Carp	0.3	0.1	3	0.4	7.2	1.4	3	8.6	nc	nc	nc	nc	nc	nc	nc	nc
White Sucker	3.2	0.7	3	3.9	3.5	0.8	3	4.3	5.7	2.5	3	8.2	6.5	2.7	3	9.2
Pumpkinseed	nc	nc	nc	nc	1.9	0.7	3	2.6	3.8	1.6	2	5.4	1.7	0.9	3	2.6
Largemouth Bass	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

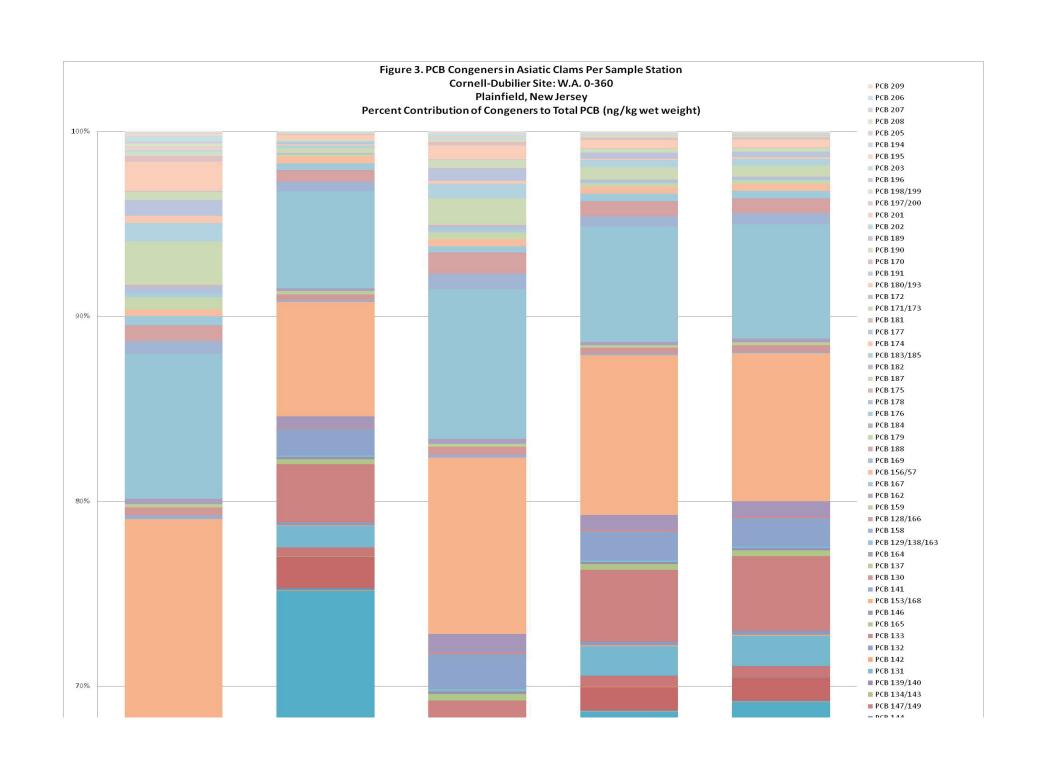
	Station A-	4: Bound Brook	upstrea	am of NMP	Stations	A-5 and A-6: N	lew Mar	ket Pond	Station A-10: Spring Lake				
	Aroclor 1254	Aroclor 1248	n	Total PCBs	Aroclor 1254	Aroclor 1248	n	Total PCBs	Aroclor 1254	Aroclor 1248	n	Total PCBs	
	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	mg/Kg w.w.	mg/Kg w.w.		mg/Kg w.w.	
Sunfish (Pumpkinseed) Whole Body	6.3	NA	7	6.3*	4.4	NA	15	4.4*	nc	nc	nc	nc	
, , , , , , , , , , , , , , , , , , , ,													
Crayfish	1.1	NA	4	1.1*	0.8	NA	3	0.8*	nc	nc	nc	nc	
Fish Fillets:													
Carp	nc	nc	nc	nc	16.8	6.9	4	23.7	1.1	0.3	3	1.4	
White Sucker	nc	nc	nc	nc	9	2.8	3	11.8	0.9	0.15	3	1.05	
Pumpkinseed	1.4	0.7	3	2.1	1.6	0.7	6	2.3	0.1	0.03	2	0.13	
Largemouth Bass	nc	nc	nc	nc	1	0.4	6	1.4	0.5	0.04	3	0.54	

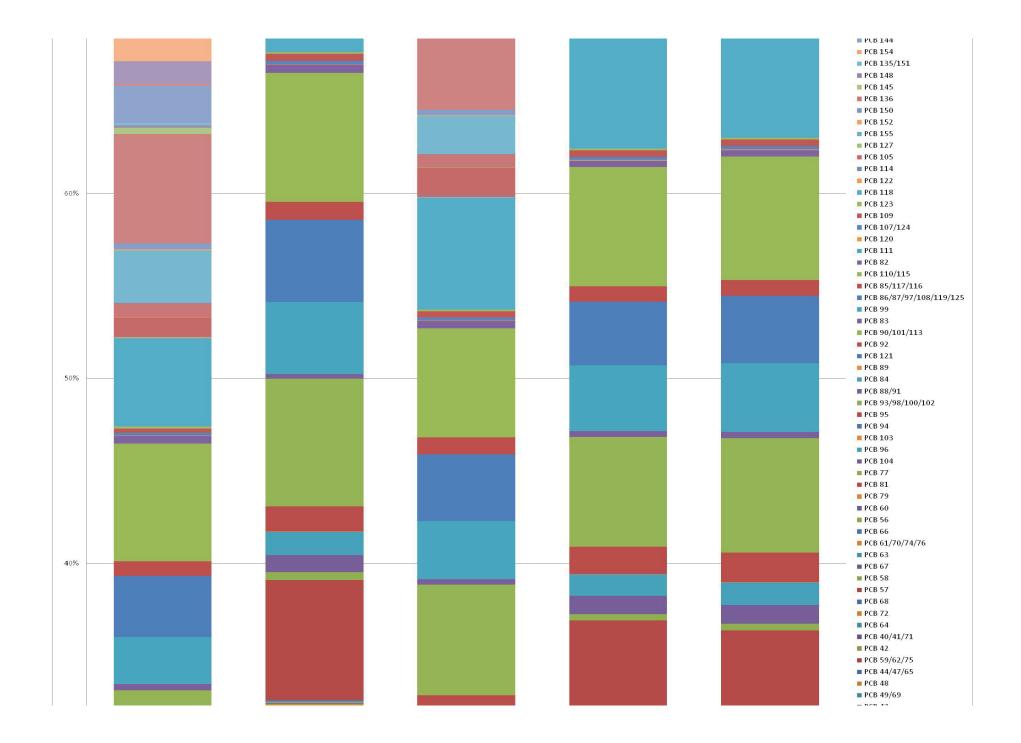
nc = Organism not collected at this station n = Number of samples analyzed NA = Not Analyzed \* = Total PCBs based on Aroclor 1254 only

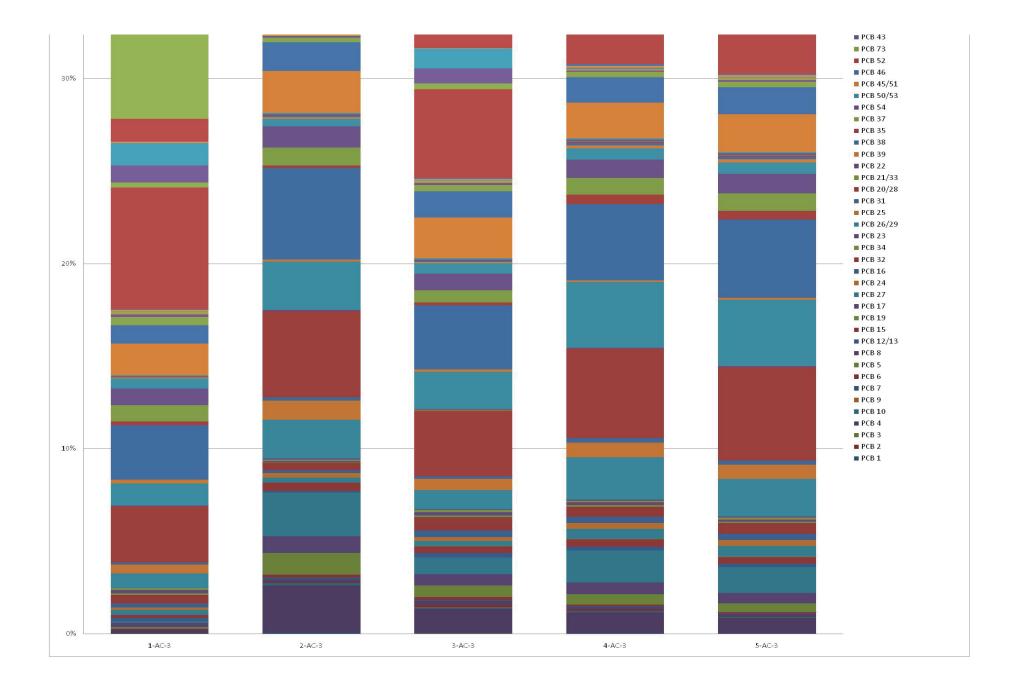
PCBs = Polychlorinated Biphenyls
mg/Kg w.w. = milligrams per kilogram wet weight
<RL = less than the analytical reporting limit
EPA 1999 = Ecological Evaluation for Cornell-Dubilier Electronics Stie. 1999 Report

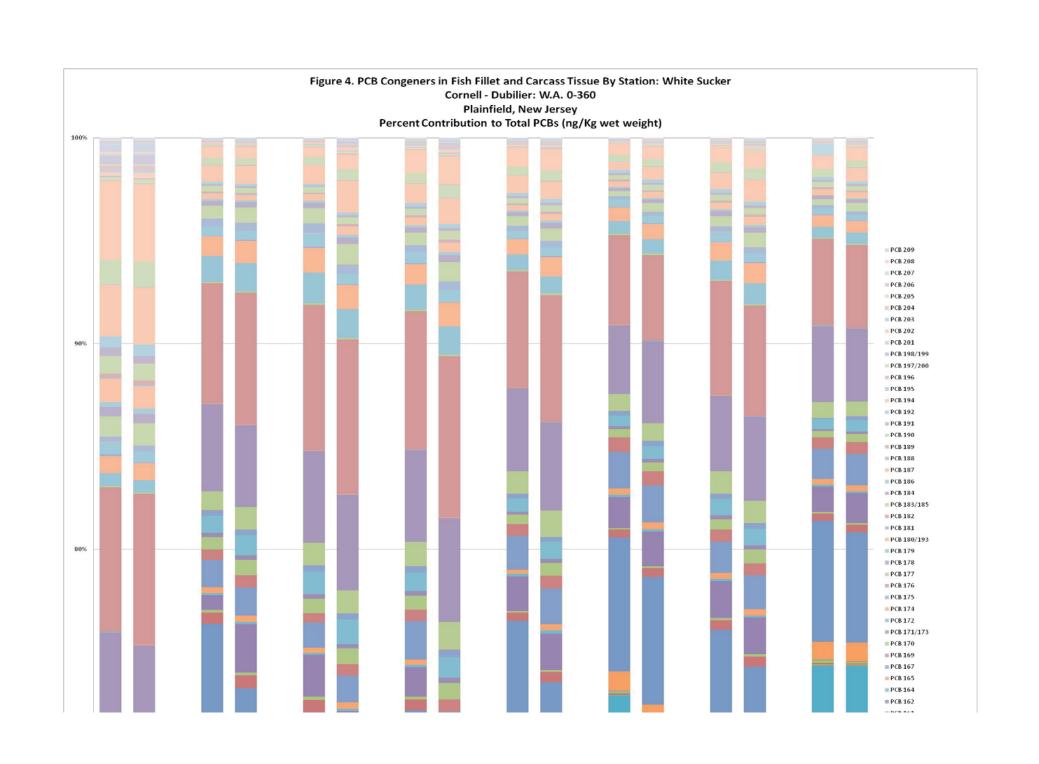


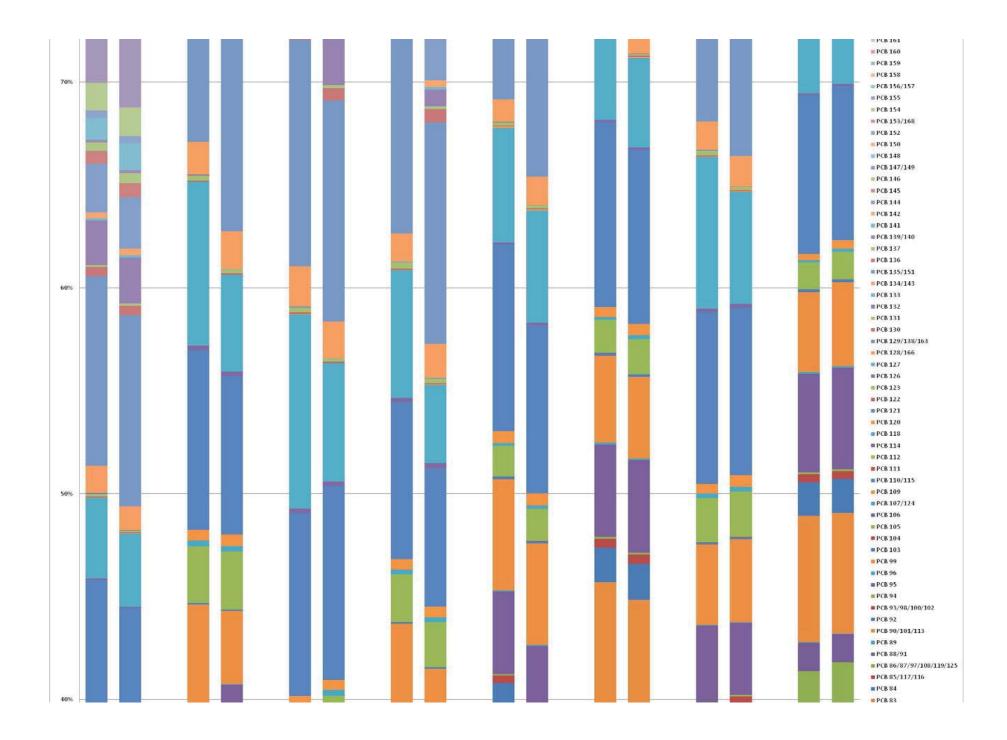


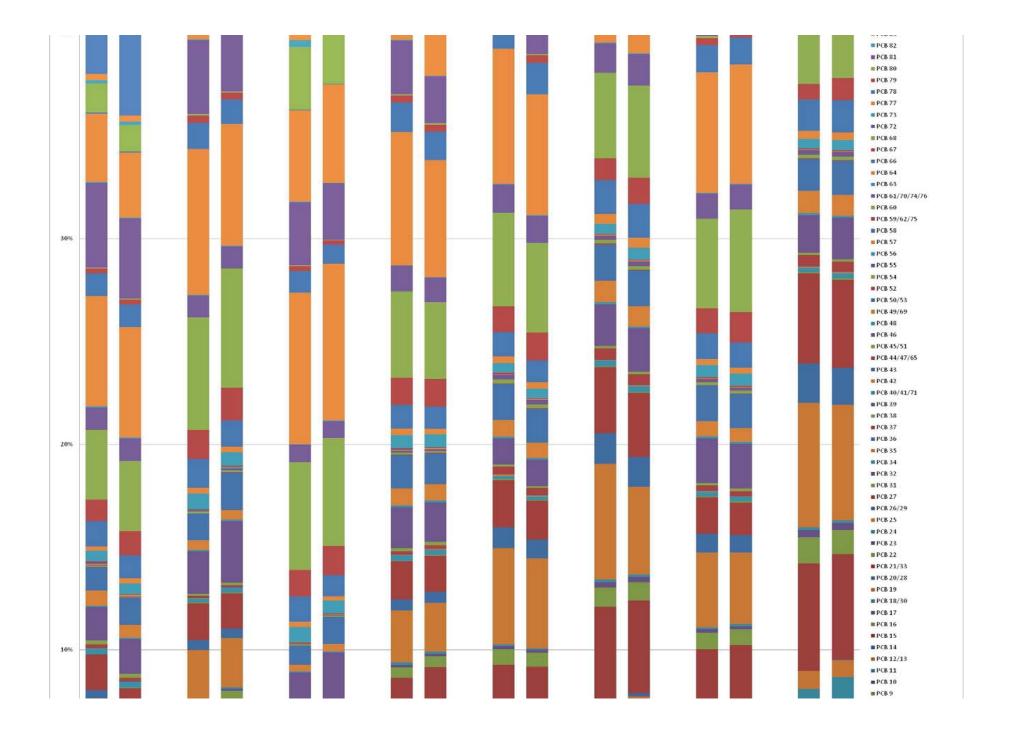


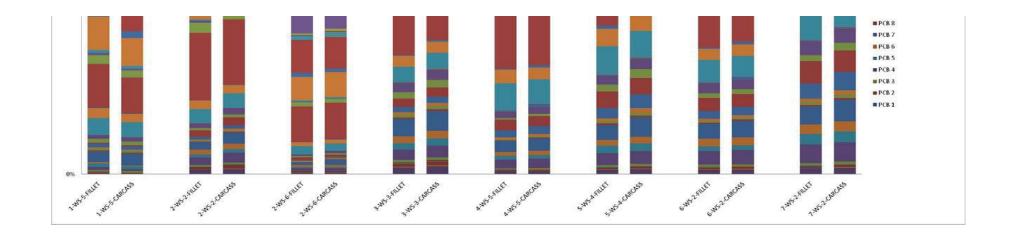


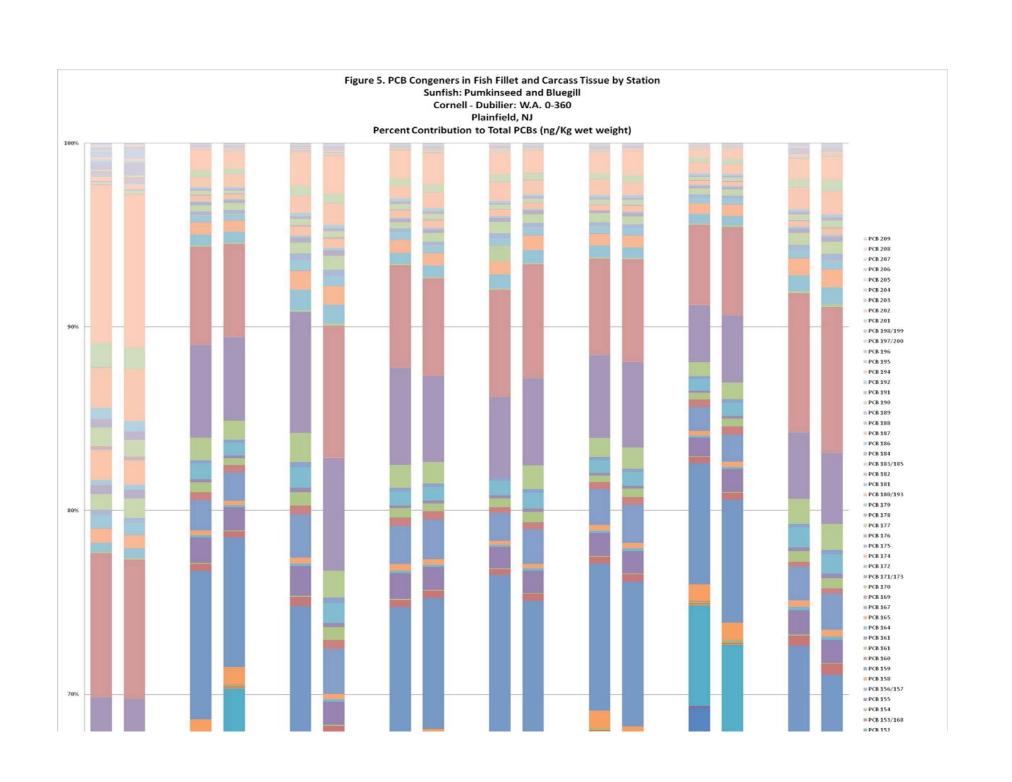


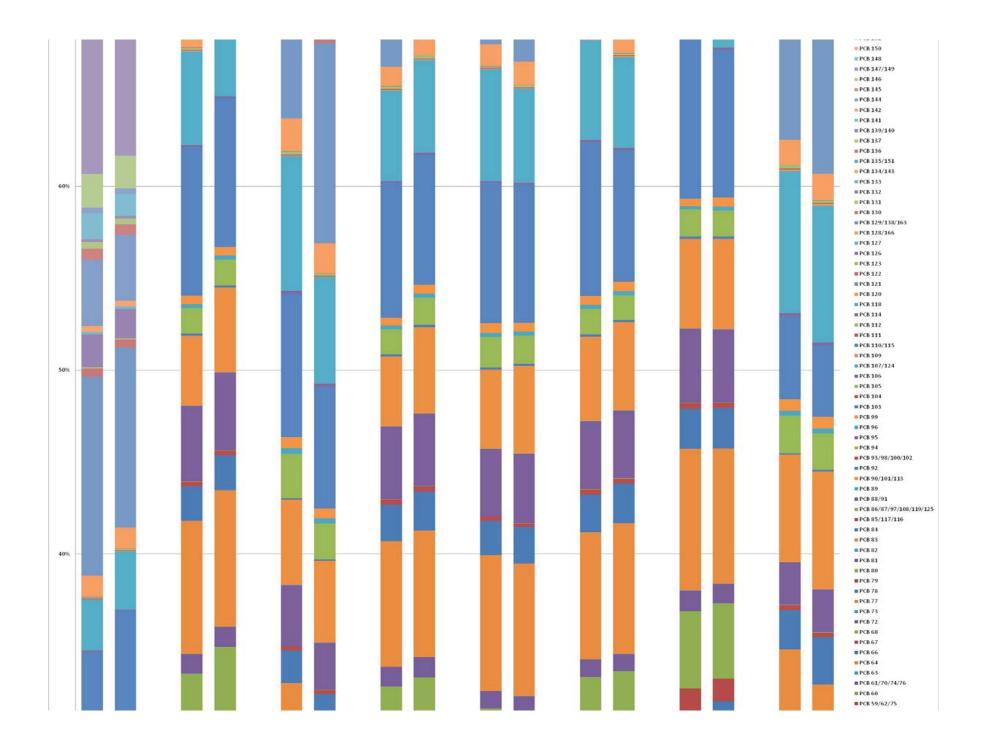


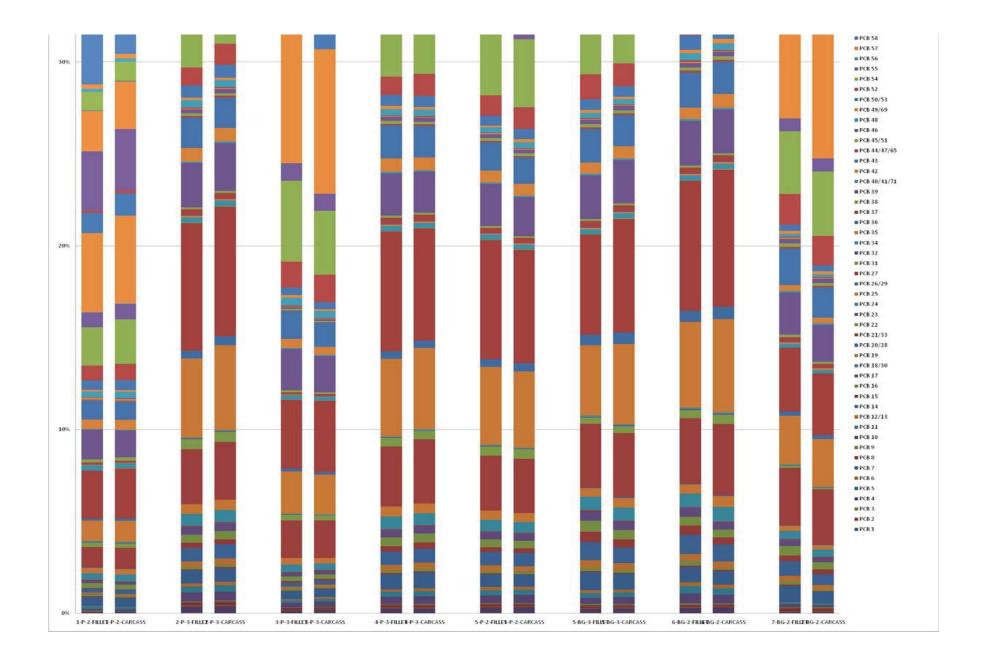


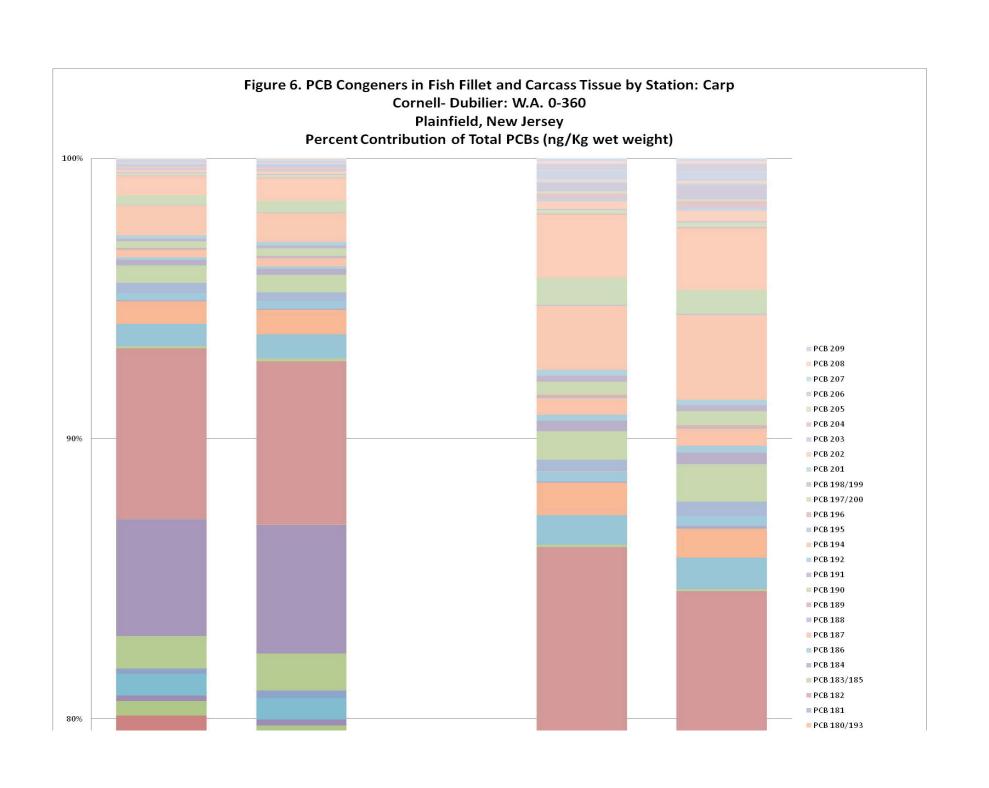


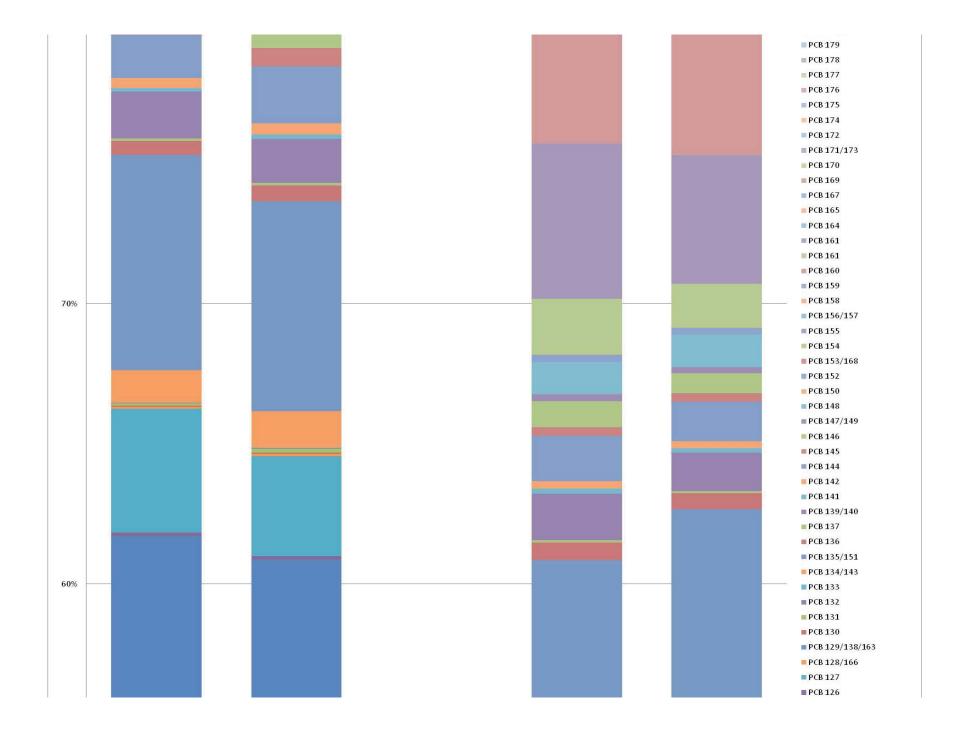


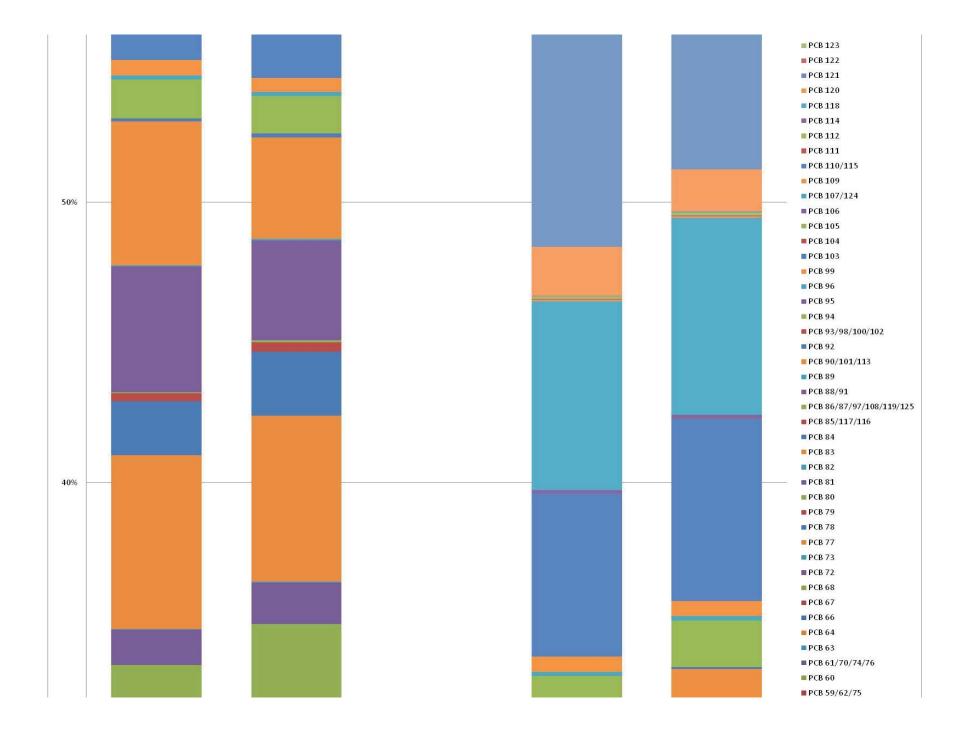


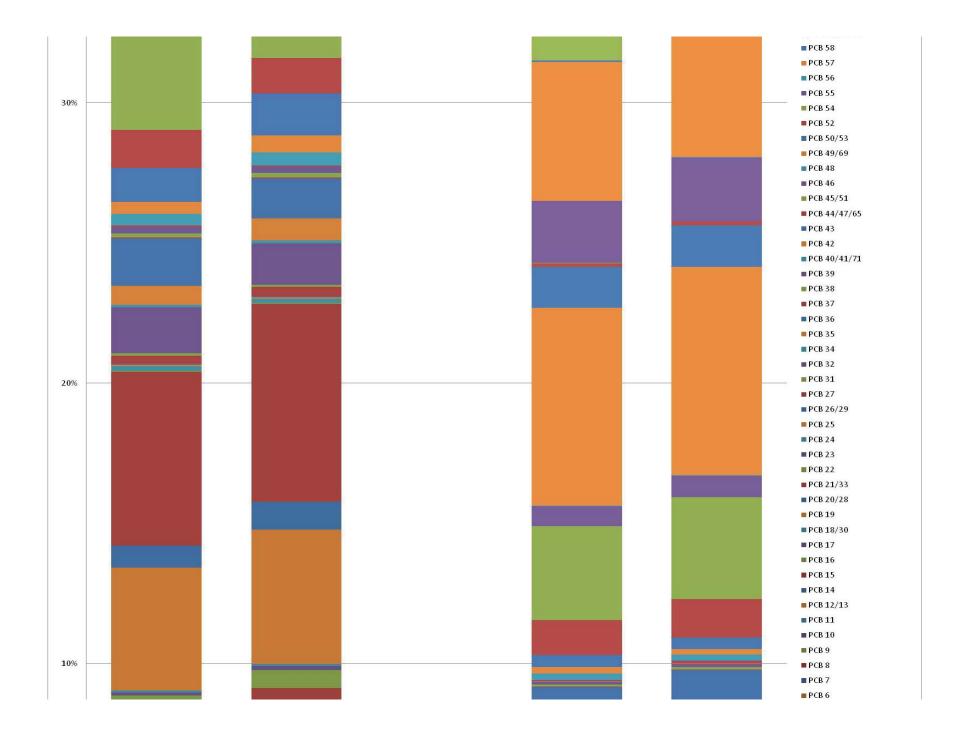


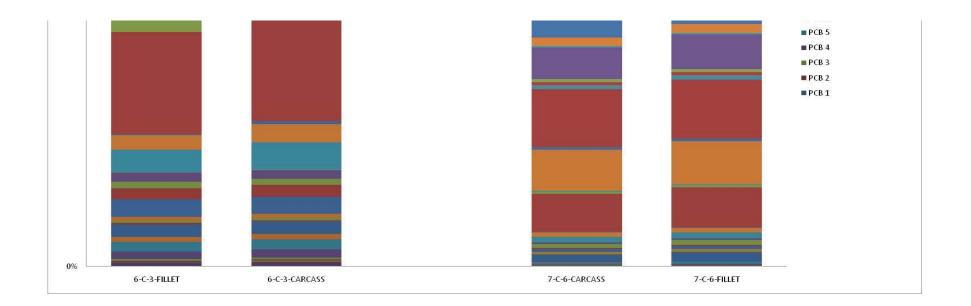


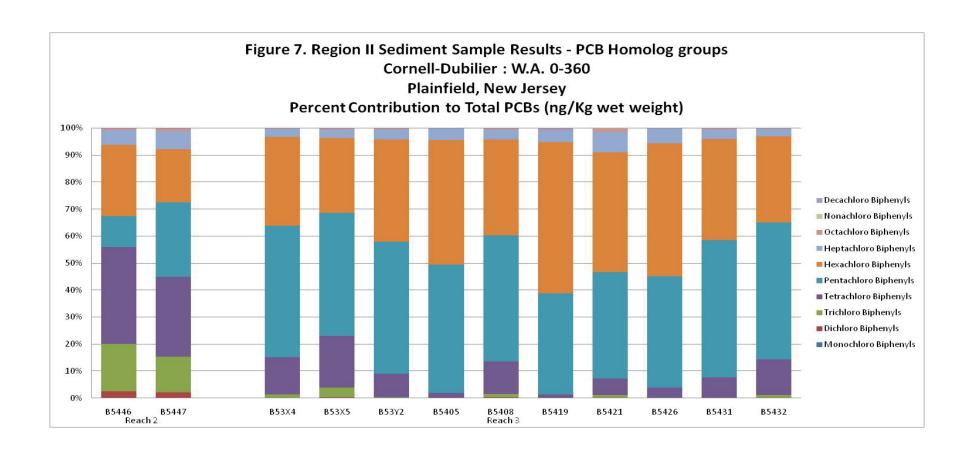


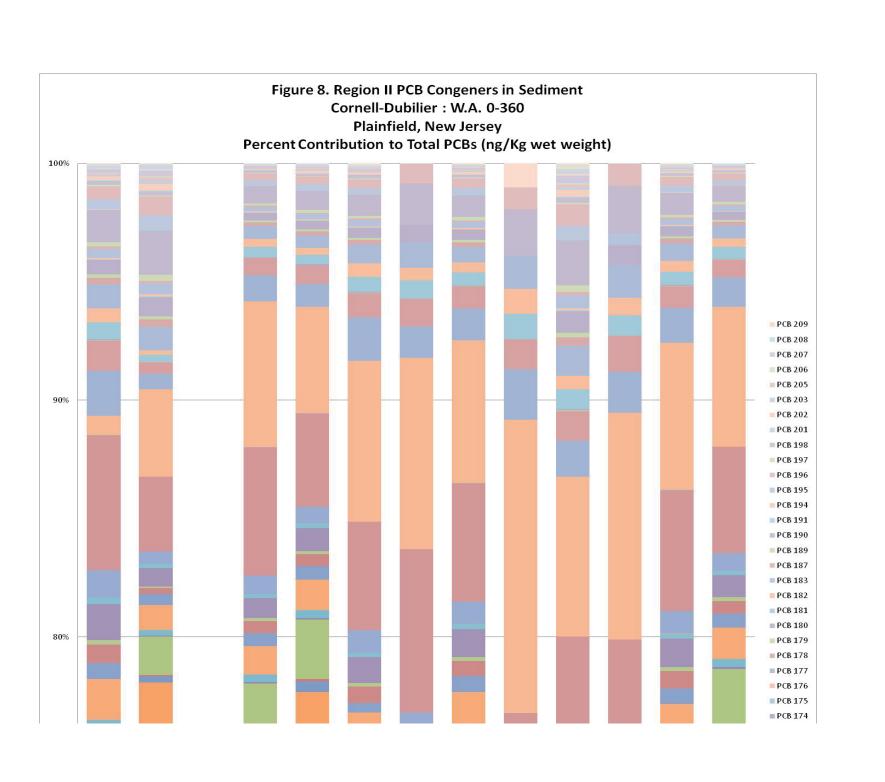


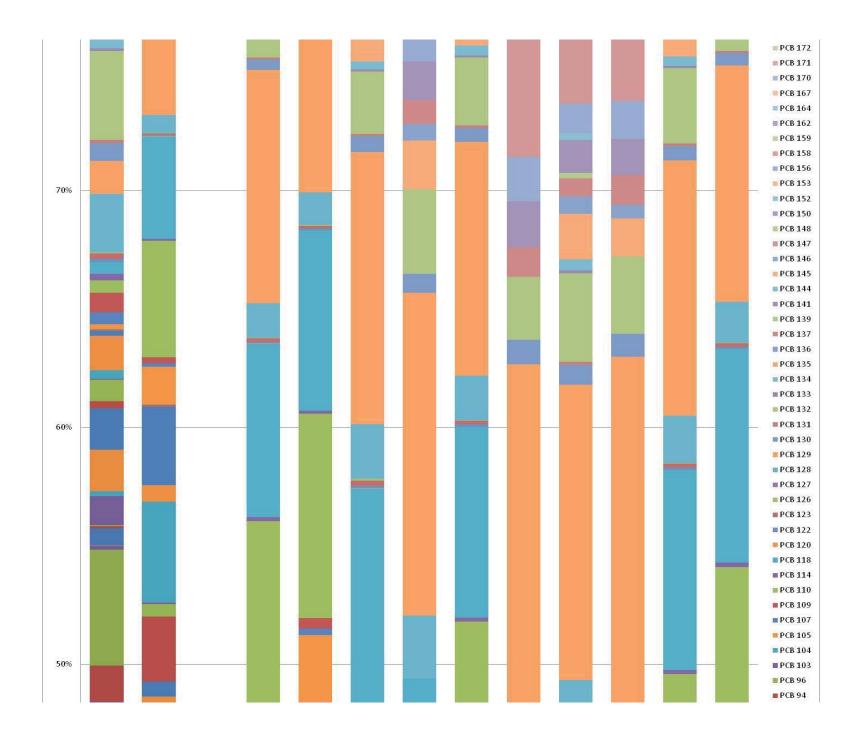


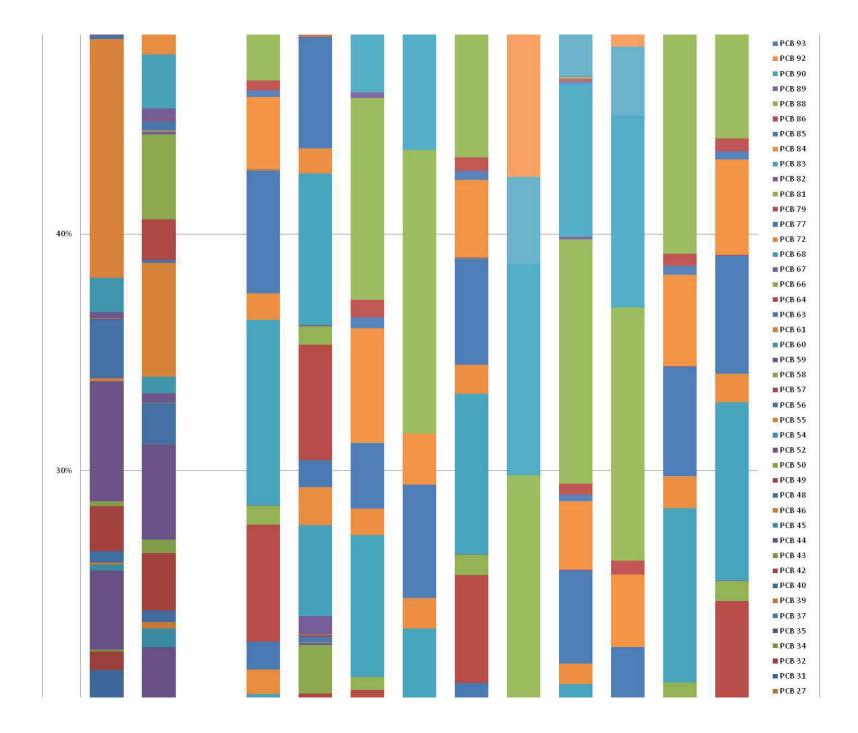












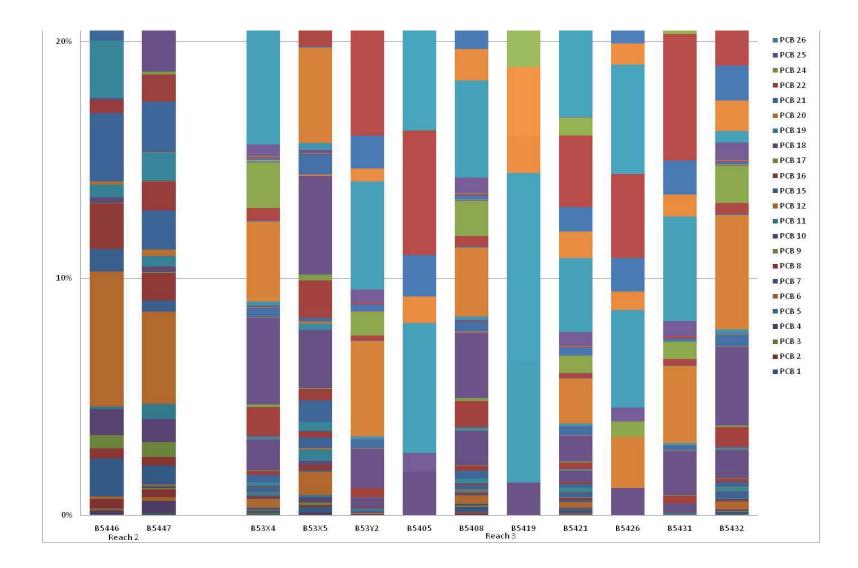
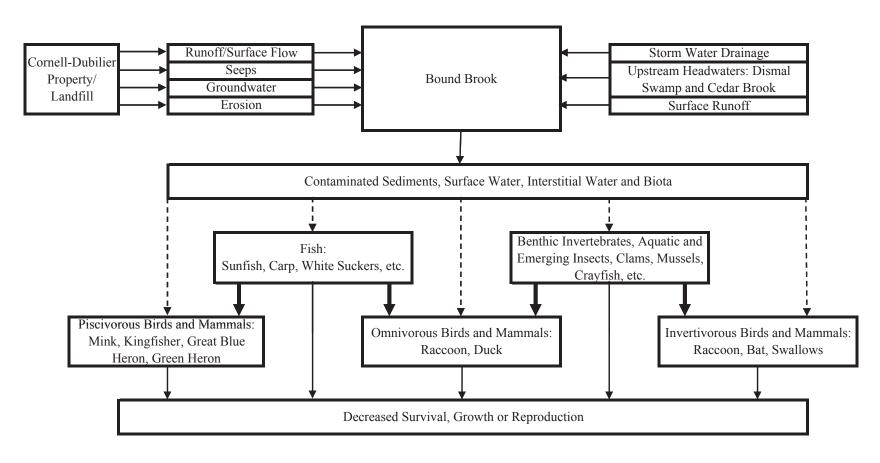


Figure 9. Conceptual Site Model Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ



Exposure Pathway Complete and Evaluated in this ERA

Exposure Pathway Complete, but not evaluated in this ERA

Figure 10: Total PCB Accumulation Based on Aroclor Determinations in Sunfish Filets (Pumpkinseed and Bluegill)

Cornell-Dubilier Bound Brook Reassessment

South Plainfield, NJ

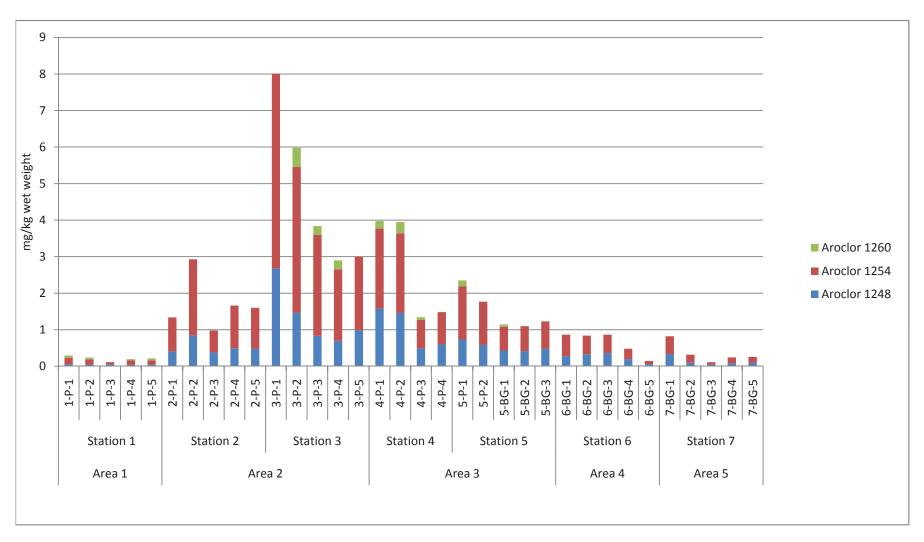


Figure 11: Total PCB Accumulation Based on Aroclor Determinations in Sunfish Carcasses (Pumpkinseed and Bluegill)

Cornell-Dubilier Bound Brook Reassessment

South Plainfield, NJ

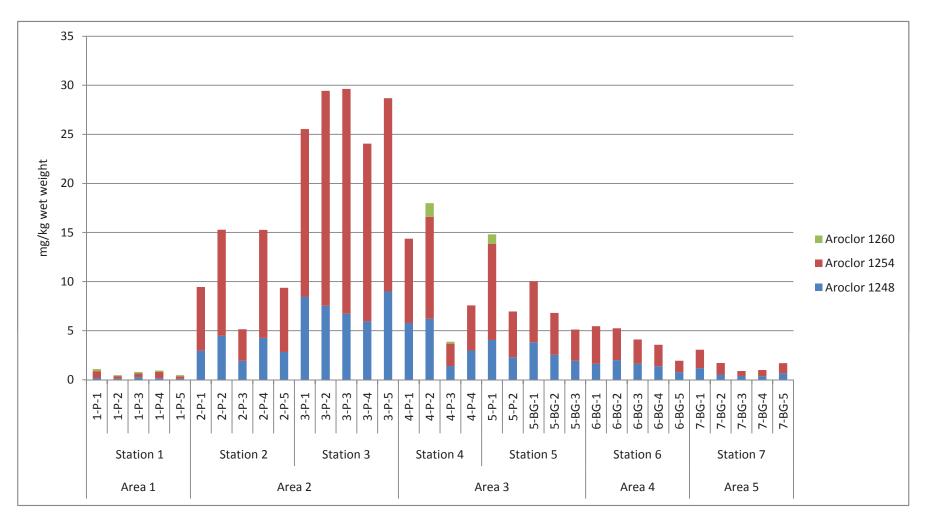


Figure 12: Whole Body Concentration of Total PCB Accumulation Based on Aroclor Determinations in Sunfish (Pumpkinseed and Bluegill)

Cornell-Dubilier Bound Brook Reassessment

South Plainfield, NJ

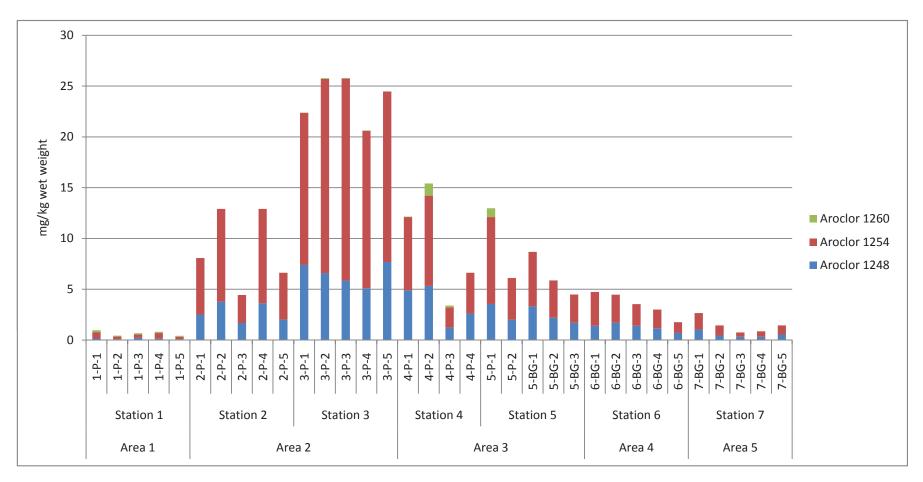


Figure 13: Total PCB Accumulation Based on Aroclor Determinations in White Sucker Filets

Cornell-Dubilier Bound Brook Reassessment

South Plainfield, NJ

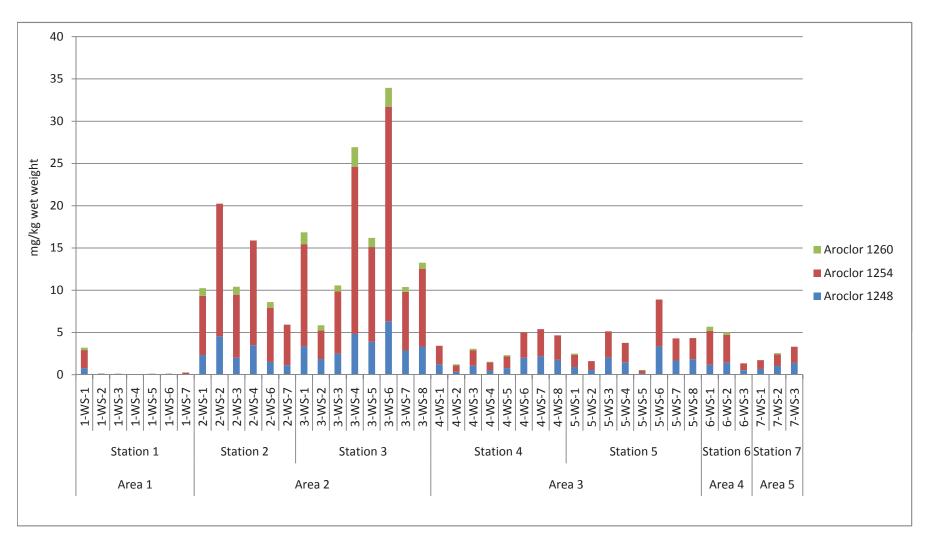


Figure 14: Total PCB Accumulation Based on Aroclor Determinations in White Sucker Carcasses

Cornell-Dubilier Bound Brook Reassessment

South Plainfield, NJ

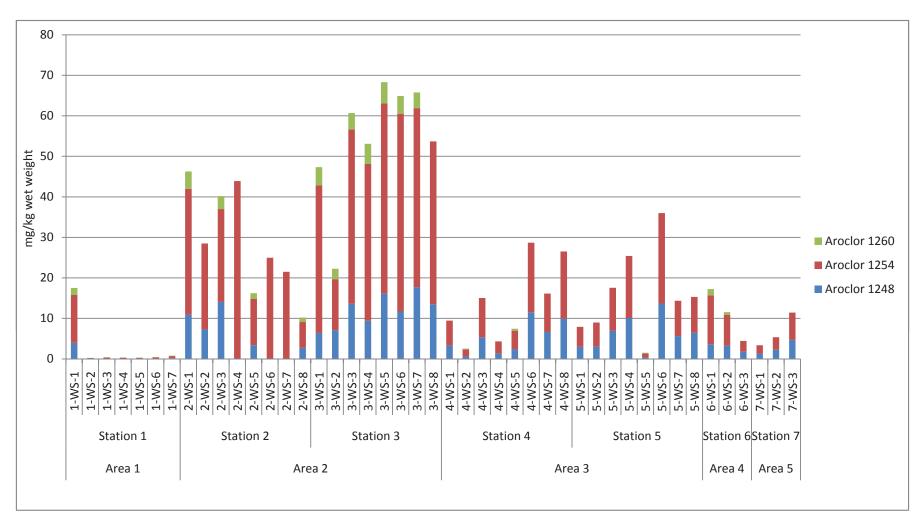


Figure 15: Whole Body Concentration of Total PCB Accumulation Based on Aroclor Determinations in White Suckers

Cornell-Dubilier Bound Brook Reassessment

South Plainfield, NJ

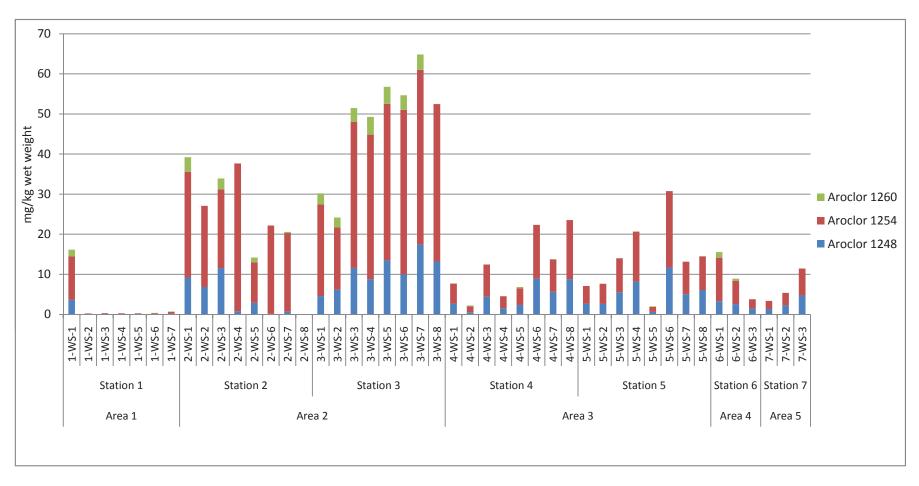


Figure 16: Total PCB Accumulation Based on Aroclor Determinations in Carp Filets
Cornell-Dubilier Bound Brook Reassessment
South Plainfield, NJ

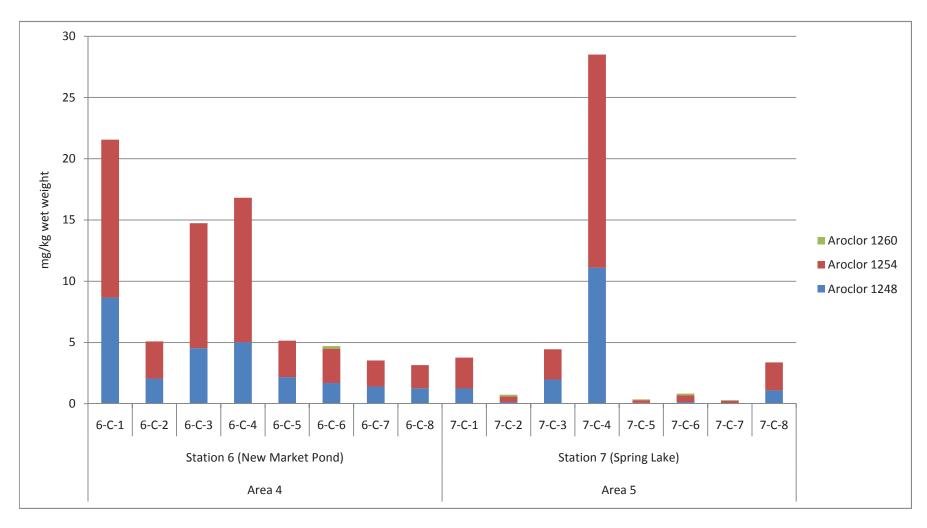


Figure 17: Total PCB Accumulation Based on Aroclor Determinations in Carp Carcasses
Cornell-Dubilier Bound Brook Reassessment
South Plainfield, NJ

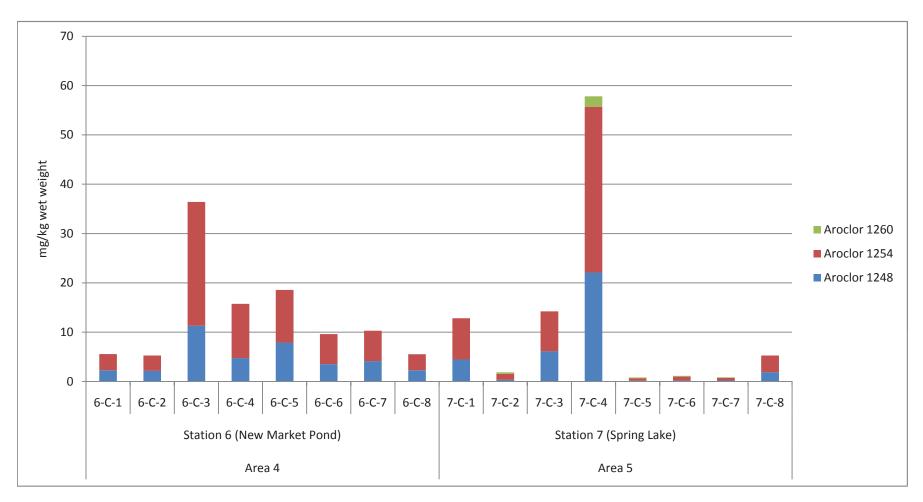


Figure 18: Whole Body Concentration of Total PCB Accumulation Based on Aroclor Determinations in Carp Cornell-Dubilier Bound Brook Reassessment South Plainfield, NJ

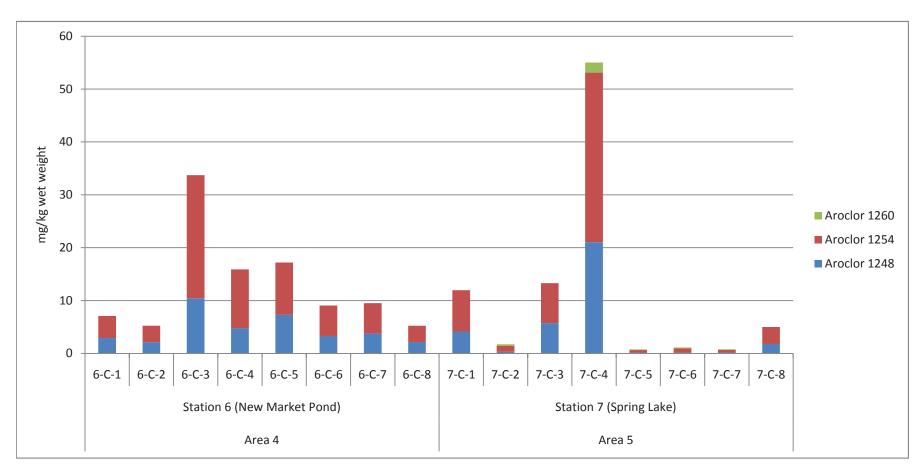
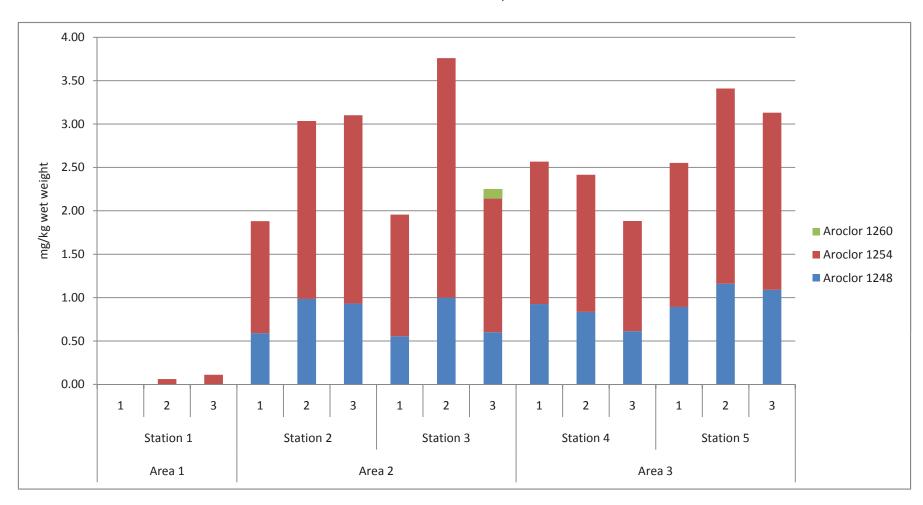


Figure 19: Total PCB Accumulatioin Based on Aroclor Determinations in Asiatic Clams
Cornell-Dubilier Bound Brook Reassessment
South Plainfield, NJ



Station 1- Reference

Date Collected 9/30/08

		Length (mm)	Weight (g)	1
	1-WS-1	151	36.7	
ſS	1-WS-2	184	69.9	
White Suckers	1-WS-3	219	112.0	
Su	1-WS-4	215	113.1	
nite	1-WS-5	236	145.6	
≷	1-WS-6	277	223.0	
	1-WS-7	374	559.7	
	1-P-1-1	152	116.1	
	1-P-1-2	156	96.6	
	1-P-1-3	147	94.6	
	1-P-1-4	136	61.2	
	1-P-1-5	134	64.9	
	1-P-2-1	118	42.1	
	1-P-2-2	106	30.4	
	1-P-2-3	113	38.3	
	1-P-2-4	114	38.8	
	1-P-2-5	98	22.7	
	1-P-2-6	96	22.7	
	1-P-2-7	101	24.3	
	1-P-2-8	102	26.4	
	1-P-3-1	103	24.1	
	1-P-3-2	108	30.4	
ų,	1-P-3-3	101	24.2	
Pumpkinseed Sunfish	1-P-3-4	110	32.0	
J SL	1-P-3-5	106	28.0	
eec	1-P-3-6	108	32.5	
kins	1-P-3-7	114	37.0	
ηpγ	1-P-4-1	133	59.6	
Pur	1-P-4-2	124	38.4	
	1-P-4-3	120	44.5	
	1-P-4-4	123	54.1	
	1-P-5-1	107	33.0	
	1-P-5-2	90	18.5	
	1-P-5-3	90	17.7	
	1-P-5-4	102	26.3	
	1-P-5-5	97	20.6	
	1-P-5-6	91	17.7	
	1-P-5-7	90	15.2	
	1-P-5-8	79	13.1	
	1-P-6-1	81	12.9	_
	1-P-6-2	95	21.0	JnC
	1-P-6-3	83	13.6	) e/
	1-P-6-4	88	15.5	Archive Only
	1-P-6-5	78	11.9	Arc

# Station 2- Site/Landfill

Date Collected 10/2/08

2-WS-1 277 222.9 2-WS-2 234 142.9 2-WS-3 185 64.6 2-WS-4 187 78.0 2-WS-5 181 56.9 2-WS-6-1 137 27.3 2-WS-6-2 151 38.4 2-WS-6-2 151 38.4 2-WS-7-1 158 38.4 2-WS-7-2 155 41.5 2-WS-8 93 9.8 Whole body Only  2-P-1-1 123 46.7 2-P-1-2 117 39.0 2-P-1-3 124 43.1 2-P-1-4 129 50.1 2-P-1-6 117 35.2 2-P-2-1 96 20.5 2-P-2-1 96 20.5 2-P-2-2 108 20.7 2-P-2-3 104 25.0 2-P-2-4 106 27.3 2-P-2-5 94 17.9 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-4-6 139 61.6 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-5 146 70.5			Length (mm)	Weight (g)	
2-WS-3		2-WS-1	277	222.9	
2-WS-4 187 78.0 2-WS-5 181 56.9 2-WS-6-1 137 27.3 2-WS-6-2 151 38.4 2-WS-6-2 155 38.4 2-WS-6-2 155 38.4 2-WS-7-1 158 38.4 2-WS-7-2 155 41.5 2-WS-8 93 9.8 Whole body Only 2-P-1-1 123 46.7 2-P-1-3 124 43.1 2-P-1-4 129 50.1 2-P-1-5 111 31.6 2-P-1-6 117 35.2 2-P-2-1 196 20.5 2-P-2-2 108 20.7 2-P-2-3 104 25.0 2-P-2-4 106 27.3 2-P-2-5 94 17.9 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-10 10.6 27.3 2-P-2-10 10.6 27.3 2-P-2-10 10.6 27.3 2-P-2-11 10.7 27.2 2-P-2-10 10.6 27.3 2-P-2-11 10.7 27.2 2-P-2-12 92 17.1 2-P-3-3 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-4-6 139 61.6 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-2 140 72.1 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-3 146		2-WS-2	234	142.9	
Page 1		2-WS-3	185	64.6	
2-WS-7-1	rs	2-WS-4	187	78.0	
2-WS-7-1	cke	2-WS-5	181	56.9	
2-WS-7-1	ns :	2-WS-6-1	137	27.3	
2-WS-7-1	nite	2-WS-6-2	151	38.4	
2-WS-7-2 155 41.5 2-WS-8 93 9.8 Whole body Only  2-P-1-1 123 46.7 2-P-1-2 117 39.0 2-P-1-3 124 43.1 2-P-1-4 129 50.1 2-P-1-5 111 35.2 2-P-1-6 117 35.2 2-P-2-1 96 20.5 2-P-2-1 96 20.5 2-P-2-2 108 20.7 2-P-2-3 104 25.0 2-P-2-3 104 25.0 2-P-2-6 106 25.3 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-11 107 27.2 2-P-3-1 129 49.9 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-4 143 69.0	₹	2-WS-6-3	153	37.7	
2-WS-8 93 9.8 Whole body Only  2-P-1-1 123 46.7 2-P-1-2 117 39.0 2-P-1-3 124 43.1 2-P-1-4 129 50.1 2-P-1-5 111 31.6 2-P-1-6 117 35.2 2-P-2-1 96 20.5 2-P-2-1 96 20.5 2-P-2-2 108 20.7 2-P-2-3 104 25.0 2-P-2-3 104 25.0 2-P-2-6 106 25.3 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-8 113 31.7 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4		2-WS-7-1	158	38.4	
2-P-1-1 123 46.7 2-P-1-2 117 39.0 2-P-1-3 124 43.1 2-P-1-4 129 50.1 2-P-1-5 111 31.6 2-P-1-6 117 35.2 2-P-2-1 96 20.5 2-P-2-2 108 20.7 2-P-2-3 104 25.0 2-P-2-3 104 25.0 2-P-2-3 104 25.0 2-P-2-6 106 27.3 2-P-2-5 94 17.9 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-4 143 69.0		2-WS-7-2	155	41.5	
2-P-1-2		2-WS-8	93	9.8	Whole body Only
2-P-1-3		2-P-1-1	123	46.7	
2-P-1-4 129 50.1 2-P-1-5 111 31.6 2-P-1-6 117 35.2 2-P-2-1 96 20.5 2-P-2-2 108 20.7 2-P-2-3 104 25.0 2-P-2-4 106 27.3 2-P-2-5 94 17.9 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-3 146 75.4 2-P-5-3 146 75.4 2-P-5-3 146 75.4 2-P-5-4 143 69.0		2-P-1-2	117	39.0	
2-P-1-5		2-P-1-3	124	43.1	
2-P-1-6		2-P-1-4	129	50.1	
2-P-1-6		2-P-1-5	111	31.6	
2-P-2-2 108 20.7 2-P-2-3 104 25.0 2-P-2-4 106 27.3 2-P-2-5 94 17.9 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-4 143 69.0			117	35.2	
2-P-2-2 108 20.7 2-P-2-3 104 25.0 2-P-2-4 106 27.3 2-P-2-5 94 17.9 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-4 143 69.0		2-P-2-1	96	20.5	
2-P-2-3		2-P-2-2	108		
2-P-2-4 106 27.3 2-P-2-5 94 17.9 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-4-6 139 61.6 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-3 146 75.4 2-P-5-3 146 75.4 2-P-5-4 143 69.0		2-P-2-3	104	25.0	
2-P-2-5 94 17.9 2-P-2-6 106 25.3 2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-4-6 139 61.6 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-3 146 75.4 2-P-5-3 146 75.4 2-P-5-4 143 69.0		2-P-2-4	106		
2-P-2-6		2-P-2-5	94		
2-P-2-7 108 27.6 2-P-2-8 113 31.7 2-P-2-9 97 22.7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-12 92 17.1 2-P-3-1 129 49.9 2-P-3-2 133 51.7 2-P-3-3 132 51.0 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-4-6 139 61.6 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-3 146 75.4 2-P-5-4 143 69.0		2-P-2-6	106		
2-P-2-8 2-P-2-9 97 22-7 2-P-2-10 106 27.3 2-P-2-11 107 27.2 2-P-2-12 2-P-2-12 2-P-3-1 2-P-3-2 2-P-3-3 132 31.7 2-P-3-4 128 49.7 2-P-3-5 128 45.9 2-P-4-1 138 64.0 2-P-4-2 141 71.7 2-P-4-3 138 65.3 2-P-4-4 147 77.1 2-P-4-5 136 59.4 2-P-4-6 139 61.6 2-P-5-1 148 78.7 2-P-5-2 140 72.1 2-P-5-3 146 75.4 2-P-5-4 143 69.0					
2-P-3-3		2-P-2-8			
2-P-3-3	fish	2-P-2-9	97	22.7	
2-P-3-3	uns	2-P-2-10	106		
2-P-3-3	ed :	2-P-2-11	107	27.2	
2-P-3-3	ıse				
2-P-3-3	pkir	2-P-3-1	129	49.9	
2-P-3-3	Ш	2-P-3-2		51.7	
2-P-3-5     128     45.9       2-P-4-1     138     64.0       2-P-4-2     141     71.7       2-P-4-3     138     65.3       2-P-4-4     147     77.1       2-P-4-5     136     59.4       2-P-4-6     139     61.6       2-P-5-1     148     78.7       2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0	۵	2-P-3-3	132	51.0	
2-P-4-1     138     64.0       2-P-4-2     141     71.7       2-P-4-3     138     65.3       2-P-4-4     147     77.1       2-P-4-5     136     59.4       2-P-4-6     139     61.6       2-P-5-1     148     78.7       2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-3-4	128	49.7	
2-P-4-2     141     71.7       2-P-4-3     138     65.3       2-P-4-4     147     77.1       2-P-4-5     136     59.4       2-P-4-6     139     61.6       2-P-5-1     148     78.7       2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-3-5	128	45.9	
2-P-4-2     141     71.7       2-P-4-3     138     65.3       2-P-4-4     147     77.1       2-P-4-5     136     59.4       2-P-4-6     139     61.6       2-P-5-1     148     78.7       2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-4-1	138	64.0	
2-P-4-4     147     77.1       2-P-4-5     136     59.4       2-P-4-6     139     61.6       2-P-5-1     148     78.7       2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-4-2			
2-P-4-5     136     59.4       2-P-4-6     139     61.6       2-P-5-1     148     78.7       2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-4-3	138	65.3	
2-P-4-5     136     59.4       2-P-4-6     139     61.6       2-P-5-1     148     78.7       2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-4-4	147	77.1	
2-P-5-1     148     78.7       2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-4-5	<del></del>		
2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-4-6	139	61.6	
2-P-5-2     140     72.1       2-P-5-3     146     75.4       2-P-5-4     143     69.0		2-P-5-1	148	78.7	
2-P-5-4 143 69.0		1	_		
2-P-5-4 143 69.0		2-P-5-3	146	75.4	
		2-P-5-4	143	69.0	
		2-P-5-5	146	70.5	

# Station 3- Adjacent to Site

Date Collected 10/2/08

		Length (mm)	Weight (g)
	3-WS-1	207	104.5
	3-WS-2	225	131.1
ers	3-WS-3	324	375.0
nck	3-WS-4	322	361.8
White Suckers	3-WS-5	352	455.7
Vhit	3-WS-6	324	438.6
>	3-WS-7	378	616.1
	3-WS-8	371	602.7
	3-P-1-1	101	22.7
	3-P-1-2	107	28.1
	3-P-1-3	104	24.5
	3-P-1-4	109	29.9
	3-P-1-5	103	24.9
	3-P-1-6	94	18.4
	3-P-1-7	96	19.9
	3-P-2-1	115	36.2
	3-P-2-2	115	36.3
_	3-P-2-3	120	43.0
Pumpkinseed Sunfish	3-P-2-4	124	44.0
Sur	3-P-3-1	134	51.7
pea	3-P-3-2	130	52.1
inse	3-P-3-3	130	47.0
pki	3-P-3-4	136	65.5
μn	3-P-3-5	133	55.1
	3-P-4-1	141	62.6
	3-P-4-2	137	62.6
	3-P-4-3	134	53.4
	3-P-4-4	137	61.7
	3-P-4-5	137	60.7
	3-P-5-1	151	83.1
	3-P-5-2	144	78.1
	3-P-5-3	143	72.8
	3-P-5-4	150	82.2
	3-P-5-5	147	79.1

## Station 4- Oakmoor Street

Date collected 9/30/08

		Length (mm)	Weight (g)
	4-WS-1	155	41.3
	4-WS-2	172	56.2
ķers	4-WS-3	194	82.6
onc	4-WS-4	205	95.3
te ;	4-WS-5	207	89.0
White Suckers	4-WS-6	250	161.6
	4-WS-7	244	149.5
	4-WS-8	268	212.4
	4-P-1-1	98	21.0
	4-P-1-2	103	30.2
	4-P-1-3	112	36.9
	4-P-1-4	116	38.1
	4-P-1-5	98	23.0
	4-P-1-6	101	23.1
ے	4-P-1-7	118	41.3
Jfis	4-P-2-1	151	91.9
Sui	4-P-2-2	146	87.8
Pumpkinseed Sunfish	4-P-2-3	148	89.1
inse	4-P-3-1	141	74.2
λdι	4-P-3-2	124	43.2
Jun	4-P-3-3	136	56.0
	4-P-3-4	120	45.9
	4-P-3-5	146	54.3
	4-P-4-1	131	55.3
	4-P-4-2	137	66.5
	4-P-4-3	132	62.8
	4-P-4-4	123	44.8
	4-P-4-5	136	55.7

## **Station 5- Clinton Avenue**

Date Collected 9/30/08

		Length (mm)	Weight (g)		
	5-WS-1	218	111.5		
i	5-WS-2	227	124.1		
	5-WS-3	268	224.3		
ćers	5-WS-4	308	318.0		
White Suckers	5-WS-5	331	410.0		
te ;	5-WS-6	382	622.3		
۸hi	5-WS-7	344	499.8		
	5-WS-8	407	702.0		_
i	5-WS-9	181	62.9	Archive only- not to be	1
	5-WS-10	327	371.9	analyzed	J
	5-P-1-1	141	74.2		-
i	5-P-1-2	141	74.7		
_	5-P-1-3	152	91.7		
fish	5-P-1-4	160	101.4		
Sun	5-P-1-5	156	105.9		
eq	5-P-1-6	155	105.1		
Pumpkinseed Sunfish	5-P-2-1	136	60.8		
pki	5-P-2-2	130	62.5		
шn	5-P-2-3	147	86.3		
<u> </u>	5-P-2-4	134	66.4		
i	5-P-2-5	141	76.8		
	5-P-2-6	138	68.4		
	5-BG-1-1	170	119.1		
i	5-BG-1-2	168	118.5		
i	5-BG-1-3	171	113.7		
i	5-BG-1-4	164	109.3		
ish	5-BG-2-1	170	106.6		
Blue Gill Sunfish	5-BG-2-2	182	148.4		
<u> </u>	5-BG-2-3	173	127.6		
	5-BG-2-4	174	127.3		
Blu	5-BG-3-1	142	71.4		
	5-BG-3-2	140	61.9		
	5-BG-3-3	151	76.7		
i	5-BG-3-4	163	86.5		
	5-BG-3-5	143	64.8		
	5-MS-1	142	81.2	Red ear sunfish	Уlс
Mixed Sunfish	5-MS-2	112	28.0	Pumpkinseed sunfish	Archive only
Mix	5-MS-3	97		Pumpkinseed sunfish	, Š
0,	5-MS-4	98		Pumpkinseed sunfish	Arc

## **Station 6- New Market Pond**

Date Collected 10/1/08

		Length (mm)	Weight (g)
er s	6-WS-1	330	415.4
White Suckers	6-WS-2	320	373.8
> 7S	6-WS-3	255	196.0
	6-C-1	600	4019
	6-C-2	480	1834
	6-C-3	550	2659
Carp	6-C-4	640	4274
ී	6-C-5	580	2800
	6-C-6	420	1186
	6-C-7	330	739
	6-C-8	420	1107
	6-BG-1-1	169	114.3
	6-BG-1-2	170	107.7
	6-BG-1-3	165	104.8
	6-BG-1-4	175	108.7
	6-BG-1-5	175	117.0
	6-BG-2-1	155	87.6
	6-BG-2-2	148	83.4
	6-BG-2-3	157	83.5
	6-BG-2-4	147	64.1
	6-BG-2-5	141	61.6
Blue Gill Sunfish	6-BG-3-1	132	45.1
n Ju	6-BG-3-2	130	45.7
<u>≅</u>	6-BG-3-3	106	26.9
e G	6-BG-3-4	105	23.7
Blu	6-BG-3-5	124	40.5
	6-BG-4-1	135	53.6
	6-BG-4-2	162	85.9
	6-BG-4-3	162	89.9
	6-BG-4-4	143	68.5
	6-BG-4-5	162	88.9
	6-BG-5-1	167	99.2
	6-BG-5-2	163	90.7
	6-BG-5-3	155	82.7
	6-BG-5-4	153	75.8
	6-BG-5-5	172	109.2

# Station 7- Spring Lake

Date Collected 10/1/08

		Length (mm)	Weight (g)
a) S	7-WS-1	380	657.7
White Suckers	7-WS-2	340	469.6
N Suc	7-WS-3	355	526.3
	7-C-1	665	5070
	7-C-2	625	3431
	7-C-3	550	2464
Carp	7-C-4	570	2715
වී	7-C-5	530	2004
	7-C-6	580	3512
	7-C-7	585	2942
	7-C-8	570	2744
	7-BG-1-1	170	105.8
	7-BG-1-2	170	107.7
	7-BG-1-3	165	108.2
	7-BG-1-4	165	84.1
	7-BG-1-5	155	82.2
	7-BG-2-1	160	76.1
	7-BG-2-2	145	61.7
	7-BG-2-3	142	54.2
	7-BG-2-4	136	54.4
	7-BG-2-5	140	61.9
Blue Gill Sunfish	7-BG-3-1	140	52.9
inni	7-BG-3-2	136	53.3
= =	7-BG-3-3	130	46.7
e G	7-BG-3-4	134	47.2
Blu	7-BG-3-5	126	39.7
	7-BG-4-1	131	50.3
	7-BG-4-2	135	49.2
	7-BG-4-3	155	70.9
	7-BG-4-4	135	48.7
	7-BG-4-5	126	43.7
	7-BG-5-1	160	87.7
	7-BG-5-2	155	72.4
	7-BG-5-3	136	62.3
	7-BG-5-4	155	83.6
	7-BG-5-5	150	75.8

Analyses	Matrix	# of Samples	# of Analyses	
Aroclor Analyses	White Sucker	37	54	
	Carp	16	32	
	Sunfish Composites	34	. 78	
	Asiatic Clams	15	15	
% Lipids	White Sucker	37	54	
	Carp	16	32	
	Sunfish Composites	34	. 78	
	Asiatic Clams	15	15	
% Solids	White Sucker	37	54	
	Carp	16	32	
	Sunfish Composites	34	. 78	
	Asiatic Clams	15	15	
PCB Congeners	White Sucker	7	14	
	Carp	2	4	
	Sunfish Composites	8	16	
	Asiatic Clams	5	10	

#### Cornell Dublier (WA #0-360) Asiatic Clams

					Clams (mg/kg wet weight)  Mass Aroclor 1248 Qualifier Aroclor 1254 Qualifier Aroclor 1260 Qualifier Total PCBs Qualifier Aroclor 1260 Qualifier Total PCBs Qualifier Aroclor 1260 Quali										Clar	ns (mg/kg	dry weight)			
	Replicate	# of Individuals	Size Range (mm)	Mass (g)	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	Aroclor 1260	Qualifier	Total PCBs	Qualifier	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	Aroclor 1260	Qualifier	Total PCBs	Qualifier
ı 1- nce	1	124	9-21	24.5	U	(0.20)	U	(0.20)	U	(0.20)	U	(0.20)	U	(2.310)	U	(2.310)	U	(2.310)	U	(2.310)
tation	2	197	8-20	53.5	U	(0.05)	0.0618	N (0.050)	U	(0.05)	0.0618		U	(0.522)	0.645	N (0.522)	U	(0.522)	0.645	
Sta Ref	3	64	21-30	50.4	U	(0.10)	0.112	N (0.10)	U	(0.10)	0.112		U	(1.010)	1.140	N (1.010)	U	(1.010)	1.140	
2- ר / הוו	1	186	12-16	51.2	0.591		1.290		U	(0.25)	1.880		0.591		12.800		U	(2.490)	18.700	
tation Site/ Landfil	2	79	16-21	53.5	0.985		2.050		U	(0.50)	3.040		10.10		21.00		U	(5.120)	31.10	
Sta	3	25	22-29	50.9	0.932		2.170		U	(0.40)	3.110		9.740		22.70		U	(4.180)	32.50	
n 3- ent te	1	272	9-18	80.8	0.556		1.400		U	(0.25)	1.960		6.450		16.20		U	(2.90)	22.70	
Station : Adjacer to Site	2	167	19-23	205.4	1.00	J (1.00)	2.760	J (1.00)	UJ	(1.00)	3.760	J (1.00)	12.40	J (12.40)	34.20	J (12.40)	UJ	(12.40)	46.60	J (12.40)
Sta Ad to	3	170	24-31	203.9	0.601		1.540		0.107	JN (0.250)	2.250		8.610		22.10		1.530	JN (3.580)	32.20	
	1	320	9-17	70.0	0.926		1.640		U	(0.50)	2.560		8.80		15.60		U	(4.750)	24.30	
	2	82	17-20	49.8	0.836		1.580		U	(0.50)	2.410		7.680		14.50		U	(4.60)	22.20	
	3	69	20-27	107.5	0.612		1.270		U	(0.25)	1.880		7.250		15.00		U	(2.960)	22.30	
າ 5- on ue	1	67	10-19	54.5	0.892		1.660		U	(0.50)	2.550		10.70		19.90		U	(5.990)	30.50	
Station Clintor Avenue	2	47	19-24	55.0	1.160		2.250		U	(0.50)	3.410		12.10		23.40		U	(5.20)	35.40	
Sta C	3	22	24-32	53.9	1.090		2.040		U	(0.50)	3.120		13.60		25.40		U	(6.230)	38.90	

mg/kg -milligrams per kilogram
MS/MSD - matrix spike/ matrix spike duplicate

U - undetected J - estimated

N -

JN -

UJ -

Note: the number in parentheses in the 'Qualifier' column is the reporting limit

																Fish Carcasses (mg/kg wet weight)									
			Length (mm)	# of Fish/ Sample	Mass (g)	% Solids	% Lipids	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	Aroclor 1260	Qualifier	Total PCBs	Qualifier	% Solids	% Lipids	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	Aroclor 1260	Qualifier	Total PCBs	Qualifier
		1-WS-1	151	1	36.7	21	0.50	0.757	Qualifier	2.150	Qualifier	0.297	JN (0.476)	3.210	Qualifier	23.5	7.5	3.970	Qualifier	11.80	Qualifier	1.750	JN (3.330)	17.50	Qualifier
	,s	1-WS-2	184	1	69.9	22	1.4	U	(0.152)	0.136	J (0.152)	U	(0.152)	0.136	J (0.152)	23.3	2.2	0.058	JN (0.0935)	0.158		0.0637	JN (0.0935)	0.280	
00	White Suckers	1-WS-3	219	1	112	21	0.94	0.0286	J (0.050)	0.0764		0.0251	JN (0.050)	0.130		25.1	3.4	0.089	N (0.050)	0.257		0.0847	N (0.050)	0.430	
I- Reference ected 9/30/08	Su.	1-WS-4	215	1	113.1	20	0.56	0.0210	J (0.050)	0.0449	J (0.050)	U	(0.050)	0.0659	J (0.050)	23.9	3.2	0.108	N (0.050)	0.213		0.0708	N (0.050)	0.392	
erer 9/3	hite	1-WS-5	236	1	145.6	20	0.97	0.0293	J (0.0654)	0.0786		U	(0.0654)	0.108		22.9	3.0	0.0764	N (0.050)	0.197		0.0633	N (0.050)	0.336	
Ref ted	3	1-WS-6	277	1	223	20	0.77	0.0279	J (0.050)	0.0895		0.0275	JN (0.050)	0.145		22.7	3.2	0.0859	JN (0.10)	0.287		0.0926	JN (0.10)	0.466	
		1-WS-7	374	1	559.7	21	1.9	0.0629		0.178		0.0483	JN (0.050)	0.289		26.1	3.2	0.203	N (0.20)	0.486		0.144	JN (0.20)	0.834	
tion C	p	1-P-1	134-156	5	433.4	25	1.4	0.0496	J (0.050)	0.186		0.0599	JN (0.050)	0.296		25.5	4.0	0.172	JN (0.20)	0.705		0.209	N (0.20)	1.090	
Station Date Coll	sh	1-P-2	96-118	8	245.7	27	2.4	0.0497	J (0.10)	0.139		0.0494	JN (0.10)	0.238		28.2	5.6	0.105	N (0.10)	0.261		0.105	N (0.10)	0.471	
	Pumpkinseed Sunfish	1-P-3	101-114	7	208.2	24	1.2	0.0521	J (0.10)	0.0572	J (0.10)	U	(0.10)	0.109	J (0.10)	28.2	5.4	0.258	N (0.10)	0.395		0.138	N (0.10)	0.790	
	mn <sub>c</sub>	1-P-4	120-133	4	196.6	23	1.4	0.0357	J (0.0769)	0.123		0.0347	JN (0.0769)	0.194		26.6	5.2	0.156	N (0.150)	0.633		0.143	JN (0.150)	0.932	
$\mathbf{H}$		1-P-5	79-107	8	162.1	24	2.7	0.0435	J (0.0667)	0.120		0.0511	JN (0.0667)	0.215		36.9	5.4	0.103	N (0.10)	0.257	. (= 0)	0.109	N (0.10)	0.468	. (= 0)
		2-WS-1	277	1	222.9	20	0.76	2.320	. (0.0=0)	7.010	. (0.0=0)	0.915	JN (1.50)	10.20	. (0.070)	22.5	2.8	10.90	JN (5.0)	31.10	J (5.0)	4.280	JN (5.0)	46.30	J (5.0)
	Ş	2-WS-2	234	1	142.9	22	1.4	4.540	J (3.970)	15.70	J (3.970)	U 0.943	J (3.970)	20.30	J (3.970)	22.2 21.8	1.8	7.30	JN (5.0)	21.20 22.90	J (5.0)	U 2.20	J (5.0)	28.50	J (5.0)
_ ~	White Suckers	2-WS-3 2-WS-4	185 187	1	64.6 78	20	0.56	2.010 3.490		7.450 12.40		0.943 U	JN (1.850) (2.140)	10.40 15.90		25.3	1.4 2.8	14.10 U	JN (5.560) J (6.850)	43.90	J (5.560) J (6.850)	3.20 U	JN (5.560) J (6.850)	40.20 43.90	J (5.560) J (6.850)
- Site/Landfill ected 10/2/08	Su.	2-WS-4 2-WS-5	181	1	56.9	20	0.94	3.490		12.40		U	(2.140)	15.90		23.1	1.8	3.40	JN (2.270)	11.40	J (0.85U)	1.40	JN (2.270)	16.20	J (0.850)
<b>'Lan</b>	hite	2-WS-6	137-153	3	103.4	19	0.83	1.510	J (1.560)	6.430		0.663	JN (1.560)	8.60		22.7	1.8	3.40 U	JN (2.270) J (7.140)	25.0	J (7.140)	1.40 U	JN (2.270) J (7.140)	25.0	J (7.140)
ite/	3	2-WS-7	155-158	2	79.9	22	0.51	1.120	J (1.300)	4.80		U.003	(0.926)	5.920		23.1	2.1	U	J (7.140)	21.50	J (5.0)	U	J (5.0)	21.50	J (5.0)
2-S		2-WS-8	93	1	9.8	- 22	0.51	1.120		4.80		0	(0.320)	3.320		25.2	1.6	2.770	3 (3.0)	6.340	3 (5.0)	1.110	JN (1.610)	10.20	3 (3.0)
Station 2- Date Colle		2-W3-8 2-P-1	111-129	6	245.7	24	0.87	0.409		0.929		U	(0.267)	1.340		25.6	3.3	2.950		6.50		U	(1.50)	9.450	
<b>Stati</b> Date	eed	2-P-2	92-113	12	290.3	25	1.1	0.848		2.080		U	(0.50)	2.930		26.0	3.4	4.480	J (2.50)	10.80	J (2.50)	U	J (2.50)	15.30	J (2.50)
, -	Pumpkinseed Sunfish	2-P-3	128-133	5	248.2	25	0.78	0.377		0.599		U	(0.20)	0.976		25.2	2.7	1.940	3 (2.50)	3.210	3 (2.50)	U	(1.0)	5.160	3 (2.30)
	mpl	2-P-4	136-147	6	399.1	26	0.80	0.493		1.170		U	(0.250)	1.660		26.8	4.2	4.270	J (2.50)	11.0	J (2.50)	Ü	J (2.50)	15.20	J (2.50)
	Pu	2-P-5	140-148	5	365.7	22	0.78	0.482		1.120		U	(0.250)	1.60		26.9	3.7	2.830	(2.00)	6.530	7 (2.00)	Ü	(1.50)	9.360	1 (=.00)
$\Box$		3-WS-1	207	1	104.5	20	0.57	3.340		12.10		1.410	JN (2.270)	16.80		23.3	1.3	6.430	JN (5.0)	36.40	J (5.0)	4.50	JN (5.0)	47.30	J (5.0)
		3-WS-2	225	1	131.1	24	0.68	1.850		3.370		0.636	JN (1.00)	5.850		23.9	2.2	7.10	JN (5.0)	12.60	J (5.0)	2.560	JN (5.0)	22.30	J (5.0)
	ers	3-WS-3	324	1	375	21	1.1	2.490	J (1.50)	7.350	J (1.50)	0.716	JN (1.50)	10.60	J (1.50)	24.5	3.2	13.60	J (5.0)	43.0	J (5.0)	4.080	JN (5.0)	60.70	J (5.0)
Site	Š	3-WS-4	322	1	361.8	21	0.85	4.820	J (5.00)	19.80	J (5.00)	2.310	JN (5.00)	27.00	J (5.00)	22.7	2.1	9.420	J (10.0)	38.70	J (10.0)	4.980	JN (10.0)	53.10	J (10.0)
jacent to Sil ted 10/2/08	White Suckers	3-WS-5	352	1	455.7	20	0.92	3.90	J (2.50)	11.20	J (2.50)	1.080	JN (2.50)	16.20	J (2.50)	23.6	4.6	16.10	J (10.0)	47.0	J (10.0)	5.180	JN (10.0)	68.30	J (10.0)
<b>cen</b>	Pi	3-WS-6	324	1	438.6	20	1.2	6.320	J (5.00)	25.40	J (5.00)	2.230	JN (5.00)	34.00	J (5.00)	23.9	3.2	11.70	J (10.0)	48.80	J (10.0)	4.390	JN (10.0)	64.90	J (10.0)
dja ecte	-	3-WS-7	378	1	616.1	20	1.1	2.850		6.950		0.579	JN (1.50)	10.40		24.7	4.8	17.70	J (5.0)	44.20	J (5.0)	3.870	JN (5.0)	65.80	J (5.0)
3- A		3-WS-8	371	1	602.7	21	0.90	3.330		9.190		0.726	JN (1.50)	13.20		24.6	4.4	13.50	J (10.0)	40.20	J (10.0)	U	J (10.0)	53.80	J (10.0)
ation :	70	3-P-1	94-109	7	168.4	25	1.2	2.680		5.330		U	(1.330)	8.010		26.8	3.3	8.440	J (5.0)	17.10	J (5.0)	U	J (5.0)	25.50	J (5.0)
Station 3- Adjacent to Site Date Collected 10/2/08	ısee sh	3-P-2	115-124	4	159.5	23	1.1	1.470		3.990		0.519	JN (0.909)	5.970		26.8	2.9	7.540	J (10.0)	21.90	J (10.0)	U	J (10.0)	29.40	J (10.0)
j"	npkinse Sunfish	3-P-3	130-136	5	271.4	24	0.84	0.834		2.760		0.245	JN (0.455)	3.830		26.3	3.4	6.730	JN (10.0)	22.90	J (10.0)	U	J (10.0)	29.70	J (10.0)
	Pumpkinseed Sunfish	3-P-4	134-141	5	301.0	25	0.81	0.697	$\sqcup$	1.960		0.240	JN (0.50)	2.90		25.4	3.4	5.950	J (5.0)	18.10	J (5.0)	U	J (5.0)	24.10	J (5.0)
$\blacksquare$	ш.	3-P-5	143-151	5	395.3	23	1.0	0.987		2.010		U	(0.50)	2.990		28.1	5.1	8.990	J (5.0)	19.70	J (5.0)	U	J (5.0)	28.70	J (5.0)
		4-WS-1	155	1	41.3	20	0.78	1.230		2.190		U	(0.678)	3.420		23.6	1.8	3.330		6.140		U	(1.50)	9.470	<b>  </b>
	Ş	4-WS-2	172	1	56.2	20	0.50	0.333		0.770		0.129	JN (0.20)	1.230		24.2	0.9	0.604		1.710		0.257	JN (0.50)	2.570	
08 08	ķe	4-WS-3	194	1	82.6	22	0.78	1.050		1.850		0.165	JN (0.408)	3.070		22.4	2.4	5.340	J (2.50)	9.70	J (2.50)	U	J (2.50)	15.0	J (2.50)
Oakmoor Street lected 9/30/08	White Suckers	4-WS-4	205	1	95.3	23	0.30	0.484		0.964		0.0891	JN (0.225)	1.540		24.0	0.8	1.360		2.980		U	(1.0)	4.340	<del>                                     </del>
<b>000</b>	hite	4-WS-5 4-WS-6	207 250	1	89 161.6	24	0.53 1.2	0.770 2.010	$\vdash$	1.390 2.990		0.142 U	JN (0.339) (1.00)	2.30 5.010		22.3	1.4 4.3	2.430 11.50	1/5 0)	4.560 17.20	1/5 0)	0.468 U	JN (1.0)	7.460	1/5.0)
akr	≥	4-WS-6 4-WS-7	244	1	149.5	20	1.5	2.010		3.220		U	(0.704)	5.010		23.8	3.6	6.670	J (5.0)	9.460	J (5.0) J (2.50)	U	J (5.0) J (2.50)	28.70 16.10	J (5.0) J (2.50)
<b>1</b> 4 0 e e		4-WS-7 4-WS-8	268	1	212.4	20	0.56	1.760	$\vdash$	2.90		U	(1.00)	4.660		22.8	2.7	9.930	J (2.50) J (5.0)	16.60	J (2.50)	U	J (2.50) J (5.0)	26.60	J (2.50)
Station 4- (	a	4-W5-8 4-P-1	98-118	7	213.6	24	1.6	1.580	$\vdash$	2.190		0.202	JN (0.50)	3.980		27.9	3.6	5.780	J (5.0)	8.590	J (5.0)	U	J (5.0)	14.40	J (5.0)
<b>tatio</b> Date	nse fish	-		3		27			$\vdash$																
5,	mpkinsee Sunfish	4-P-2 4-P-3	146-151 120-146	5	268.8 273.6	22	1.2 0.67	1.460 0.497	$\vdash$	2.180 0.772		0.309 0.0713	JN (0.50) JN (0.133)	3.960 1.340		26.9 26.3	3.8 1.6	6.20 1.40	J (2.50)	10.40 2.280	J (2.50)	1.390 0.198	J (2.50) J (0.50)	18.0 3.880	J (2.50)
11 1	= =		120 170	,	273.0		0.07	0.457		0.772		0.0713	3.4 (0.133)	1.540		20.3	1.0	1.40		2.200	I	0.150	3 (0.50)	3.000	

I	D P	4-P-4	123-137	5	285.1	22	0.94	0.598		0.884		U	(0.20)	1.480	ı	28.0	4.3	2.980	1	4.590	1	U	(1.0)	7.570	1 1
-	-	5-WS-1	218	1	111.5	20	0.95	0.906		1.450		0.150	JN (0.354)	2.510		22.2	2.2	2.990		4.950		IJ	(1.50)	7.940	
		5-WS-2	227	1	124.1	20	0.48	0.550		1.060		U	(0.328)	1.610		22.1	2.0	3.030		5.950		U	(1.50)	8.980	
	5	5-WS-3	268	1	224.3	20	1.1	2.020		3.110		U	(1.140)	5.140		22.4	3.0	6.940	1	10.60	J (2.50)	IJ	J (2.50)	17.50	J (2.50)
	cke	5-WS-4	308	1	318	21	0.96	1.480		2.290		U	(0.549)	3.770		21.8	2.7	10.10	J (5.0)	15.30	J (5.0)	U	J (5.0)	25.40	J (5.0)
<b>Avenu</b> '30/08	White Suckers	5-WS-5	331	1	410	21	1.9	0.145		0.354		0.060	JN (0.10)	0.559		25.7	4.5	0.386	3 (3.0)	0.952	3 (3.0)	0.175	JN (0.250)	1.510	3 (3.0)
Ave '30,	ji ji	5-WS-6	382	1	622.3	21	1.6	3.340		5.550		U	(1.50)	8.890		24.8	4.5	13.70	J (5.0)	22.30	J (5.0)	U U	J (5.0)	36.0	J (5.0)
(no:	>	5-WS-7	344	1	499.8	22	1.9	1.680		2.610		U	(1.00)	4.290		24.5	4.7	5.650	J (2.50)	8.730	J (2.50)	U	J (2.50)	14.40	J (2.50)
<b>Clinto</b> lected		5-WS-8	407	1	702	21	1.7	1.830	J (1.00)	2.50	J (1.00)	U	J (1.00)	4.340	J (1.00)	23.3	5.1	6.480	J (2.50)	8.820	J (2.50)	U	J (2.50)	15.30	J (2.50)
<b>₹</b>	umpkin- seed Sunfish	5-P-1	141-160	6	553.0	23	0.74	0.733	3 (1.00)	1.460	3 (1.00)	0.158	JN (0.250)	2.350	3 (1.00)	27.8	3.1	4.050	JN (2.50)	9.780	J (2.50)	0.977	J (2.50)	14.80	J (2.50)
Station Date	Pumpkin- seed Sunfish	5-P-2	130-147	6	421.2	23	0.86	0.585		1.180		U	(0.250)	1.770		26.8	2.8	2.290		4.670		U	(1.0)	6.960	
	Gill	5-BG-1	164-171	4	460.6	21	0.72	0.429		0.654		0.0603	JN (0.150)	1.140		26.5	3.9	3.830	J (1.50)	6.210	J (1.50)	U	J (1.50)	10.0	J (1.50)
	Blue Gill Sunfish	5-BG-2	170-182	4	509.9	21	0.70	0.414		0.684		U	(0.150)	1.10		27.1	3.6	2.540		4.270		U	(1.0)	6.810	
	Blu Su	5-BG-3	140-163	5	361.3	22	0.83	0.484		0.745		U	(0.20)	1.230		25.0	3.0	1.940		3.170		U	(1.0)	5.110	
1	e sirs	6-WS-1	330	1	415.4	20	0.62	1.180		4.010		0.480	JN (1.00)	5.680		21.2	1.6	3.620	J (2.50)	12.10	JN (2.50)	1.540	J (2.50)	17.30	J (2.50)
	White Suckers	6-WS-2	320	1	373.8	20	1.1	1.420		3.30		0.288	JN (0.667)	5.010		22.3	2.3	3.250	J (1.50)	7.60	J (1.50)	0.694	JN (1.50)	11.50	J (1.50)
	> 1S	6-WS-3	255	1	196	22	1.1	0.530		0.817		U	(0.267)	1.350		24.1	3.5	1.770		2.690	J (1.0)	U	(1.0)	4.460	J (1.0)
		6-C-1	600	1	4019	28	9.0	8.660	J (5.00)	12.90	J (5.00)	U	J (5.00)	21.60	J (5.00)	32.5	6.4	2.290	J (1.0)	3.280	J (1.0)	U	J (1.0)	5.570	J (1.0)
Pond 08		6-C-2	480	1	1834	24	4.1	2.050		3.040		U	(1.00)	5.080		26.1	3.7	2.140	J (1.0)	3.140	J (1.0)	U	J (1.0)	5.280	J (1.0)
1/C		6-C-3	550	1	2659	27	4.2	4.540	J (2.50)	10.20	J (2.50)	U	J (2.50)	14.70	J (2.50)	31.4	10.1	11.30	J (10.0)	25.10	J (10.0)	U	J (10.0)	36.40	J (10.0)
v Market Por ted 10/1/08	Carp	6-C-4	640	1	4274	24	3.8	5.020	J (5.00)	11.80	J (5.00)	U	J (5.00)	16.80	J (5.00)	28.1	6.7	4.750	J (5.0)	11.0		U	(5.0)	15.80	
× ≥	٥	6-C-5	580	1	2800	26	3.2	2.170	J (1.00)	2.980	J (1.00)	U	J (1.00)	5.150	J (1.00)	36.4	10.1	7.880	J (2.50)	10.70	J (2.50)	U	J (2.50)	18.60	J (2.50)
6- New Collecte		6-C-6	420	1	1186	24	4.0	1.690		2.810		0.209	JN (0.50)	4.710		29.6	7.0	3.50	J (1.50)	6.120	J (1.50)	U	J (1.50)	9.620	J (1.50)
- <b>9 c</b>		6-C-7	330	1	739	24	3.3	1.40		2.130		U	(0.50)	3.530		29.8	8.6	4.120	J (1.50)	6.180	J (1.50)	U	J (1.50)	10.30	J (1.50)
<b>Station</b> Date		6-C-8	420	1	1107	23	3.1	1.260		1.890		U	(0.50)	3.150		29.9	5.1	2.270		3.260		U	(1.0)	5.530	
Sta	Gill Sunfish	6-BG-1	165-175	5	552.5	21	0.64	0.277		0.589		U	(0.150)	0.866		26.3	2.7	1.620	J (1.0)	3.830	J (1.0)	U	J (1.0)	5.460	J (1.0)
	Sur	6-BG-2	141-157	5	380.2	21	0.72	0.332		0.507		U	(0.150)	0.839		27.2 25.5	2.9	2.0	J (1.0)	3.240	J (1.0)	U	J (1.0)	5.250	J (1.0)
	≣	6-BG-3	105-132	5	181.9	21	0.68	0.359	1			U	(0.154)	0.866			2.5	1.640	1	2.460	<del> </del>	U U	(0.50)	4.10	1
	Blue	6-BG-4 6-BG-5	135-162	5	386.8	21	0.42	0.195	1 (0.050)	0.284	1 (0.050)	U	(0.10)	0.479	1 (0.050)	25.0	2.5 1.7	1.380		2.180	1	U	(0.50)	3.570	
-		7-WS-1	153-172 380	5 1	457.6 657.7	21	0.18 3.1	0.0594	J (0.050)	0.0859 1.030	J (0.050)	U	J (0.050) (0.50)	0.145 1.720	J (0.050)	25.4 24.8	5.4	0.776 1.350		1.160 2.050	1	U	(0.250)	1.940 3.40	
	ite	7-WS-2	340	1	469.6	20	1.3	1.020		1.410		0.130	JN (0.333)	2.570		21.8	2.3	2.270	-	3.090		U	(1.0)	5.360	
	White Suckers	7-WS-2	355	1	526.3	21	1.9	1.40		1.410		U.13U	(0.50)	3.320		24.4	4.9	4.720		6.720	+	U	(1.50)	11.40	+
	<u> </u>	7-W3-3	665	1	5070	22	2.7	1.240		2.520	J (0.50)	U	(0.50)	3.760	J (0.50)	30.6	6.6	4.720	J (2.50)	8.370	J (2.50)	U	J (2.50)	12.80	J (2.50)
		7-C-1 7-C-2	625	1	3431	24	3.8	0.140	J (0.150)	0.465	3 (0.50)	0.125	JN (0.150)	0.730	3 (0.50)	28.5	7.3	0.327	JN (0.50)	1.230	N (0.50)	0.309	J (2.50)	1.870	J (2.JU)
<b>e</b> 8		7-C-2 7-C-3	550	1	2464	24	3.3	1.970	7 (0.130)	2.470		U.123	(0.50)	4.440	<del>                                     </del>	30.1	7.4	6.110	J (2.50)	8.120	J (2.50)	U.309	J (2.50)	14.20	J (2.50)
7-Spring Lake	a.	7-C-3	570	1	2715	28	8.2	11.10	J (5.00)	17.40	J (5.00)	U	J (5.00)	28.50	J (5.00)	35.8	12.4	22.10	J (5.0)	33.60	J (5.0)	2.110	J (5.0)	57.80	J (5.0)
ring d 1	Carp	7-C-5	530	1	2004	23	3.7	0.0674	J (0.10)	0.223	3 (5.00)	0.067	JN (0.10)	0.357	3 (3.00)	31.0	8.1	0.157	JN (0.250)	0.518	N (0.250)	0.140	J (0.250)	0.815	3 (3.0)
- <b>S</b> r		7-C-5	580	1	3512	23	3.7	0.130	J (0.20)	0.568		0.133	JN (0.10)	0.830		29.2	5.5	0.177	JN (0.250)	0.792	. (0.230)	0.140	J (0.250)	1.160	
Station 7-9 Date Collec		7-C-7	585	1	2942	26	3.8	0.0599	J (0.10)	0.192		0.0457	JN (0.10)	0.298		35.0	10.0	0.177	J (0.250)	0.539	<del>                                     </del>	0.129	J (0.250)	0.864	
atic te C	l	7-C-7	570	1	2744	25	4.4	1.090	3 (0.10)	2.290		U.0437	(1.0)	3.380	<b> </b>	28.9	6.1	1.90	J (1.50)	3.360	J (1.50)	U.123	J (1.50)	5.260	J (1.50)
S S	ج	7-C-8 7-BG-1	155-170	5	488.0	21	0.86	0.335		0.486		U	(0.150)	0.821	<del>                                     </del>	28.2	3.1	1.180	3 (1.50)	1.880	3 (1.50)	U	(0.50)	3.060	3 (1.50)
	nfis	7-BG-1 7-BG-2	136-160	5	308.3	20	0.74	0.0984		0.480		U	(0.0588	0.318		26.1	3.2	0.532		1.170	1	IJ	(0.50)	1.70	
	Gill Sunfish	7-BG-3	126-140	5	239.8	22	0.67	0.044	J (0.050)	0.0655		U	(0.050)	0.109		26.0	3.6	0.392		0.505	1	U	(0.250)	0.897	
	<u></u>	7-BG-4	126-155	5	262.8	21	0.76	0.0834	. (5.555)	0.161		U	(0.050)	0.245		25.8	3.4	0.375		0.621	1	U	(0.250)	0.996	
	Blue	7-BG-5	136-160	5	381.8	21	0.49	0.0984		0.159		U	(0.050)	0.257		25.7	2.4	0.647		1.050	1	IJ	(0.250)	1.70	
Щ_	ш	,-00-3	130-100	J	301.0	21	0.43	0.0304		0.133		U	(0.030)	0.237		23.7	2.4	0.047	1	1.030	1	U	(0.230)	1.70	1

U- Not detected

J- Value is estimated

N- Presumptively present

UJ- Not detected and reporting limit is estimated

										Fish Filets (	mg/kg dry	weight)							Fis	sh Carcasses (m	g/kg dry w	eight)			
			Length	# of Fish/	Mass	%	%																		
		1-WS-1 151 1 36.7 21 0.50 3.60 10.20 1.410 JN (2.270) 15.30													Qualifier	% Solids	% Lipids	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	7.447	Qualifier	Total PCBs	Qualifier
		-	_				-		(0.004)		. (0.004)				1 (0 504)	23.5	1.5	16.894	111 (0. 101)	50.213			JN (14.170)	74.468	
	ers	1-WS-2	184	1	69.9	22	1.4	U	(0.691)	0.618	J (0.691)	U	(0.691)	0.618	J (0.691)	23.3	2.2	0.249	JN (0.401)	0.678		0.273	JN (0.401)	1.202	<b>-</b>
a 8	χ	1-WS-3	219	1	112	21	0.94	0.136	J (0.238)	0.364		0.120	JN (0.238)	0.619		25.1	3.4	0.355	N (0.199)	1.024		0.337	N (0.199)	1.713	
30/	te S	1-WS-4	215	1	113.1	20	0.56	0.105	J (0.250)	0.225	J (0.250)	U	(0.250)	0.330	J (0.250)	23.9	3.2	0.452	N (0.209)	0.891		0.296	N (0.209)	1.640	
Reference ted 9/30/0	White Suckers	1-WS-5	236	1	145.6	20	0.97	0.147	J (0.327)	0.393		U	(0.327)	0.540		22.9	3.0	0.334	N (0.218)	0.860		0.276	N (0.218)	1.470	
L- Refe		1-WS-6	277	1	223	20	0.77	0.140	J (0.250)	0.448		0.138	JN (0.250)	0.725		22.7	3.2	0.378	JN (0.441)	1.260		0.408	JN (0.441)	2.050	
ion 1		1-WS-7	374	1	559.7	21	1.9	0.30	. ( )	0.848		0.230	JN (0.238)	1.380		26.1	3.2	0.778	N (0.766)	1.860		0.552	JN (0.766)	3.20	
Station 1-	eq	1-P-1	134-156	5	433.4	25	1.4	0.198	J (0.20)	0.744		0.240	JN (0.20)	1.180		25.5	4.0	0.675	JN (0.784)	2.760		0.820	N (0.784)	4.270	<b>├</b>
<b>Stat</b> Date	nse ish	1-P-2	96-118	8	245.7	27	2.4	0.184	J (0.370)	0.515		0.183	JN (0.370)	0.881		28.2	5.6	0.372	N (0.355)	0.926		0.372	N (0.355)	1.670	
	Pumpkinseed Sunfish	1-P-3	101-114	7	208.2	24	1.2	0.217	J (0.417)	0.238	J (0.417)	U	(0.417)	0.454	J (0.417)	28.2	5.4	0.915	N (0.355)	1.40		0.489	N (0.355)	2.80	
	nn S	1-P-4	120-133	4	196.6	23	1.4	0.155	J (0.334)	0.535		0.151	JN (0.334)	0.843		26.6	5.2	0.586	N (0.564)	2.380		0.538	JN (0.564)	3.50	
		1-P-5	79-107	8	162.1	24	2.7	0.181	J (0.278)	0.50		0.213	JN (0.278)	0.896		36.9	5.4	0.279	N (0.271)	0.696	1 (00 00)	0.295	N (0.271)	1.270	. (00.00)
		2-WS-1	277	1	222.9	20	0.76	11.60	. (40.00)	35.10	. (40.00)	4.580	JN (7.50)	51.00	. (40.00)	22.5	2.8	48.40	JN (22.20)	138.0	J (22.20)	19.0	JN (22.20)	206.0	J (22.20)
I	'n	2-WS-2	234	1	142.9	22	1.4	20.60	J (18.00)	71.40	J (18.00)	U 4 720	J (18.00)	92.30	J (18.00)	22.2	1.8	32.90	JN (22.50)	95.50	J (22.50)	U	J (22.50)	128.0	J (22.50)
	ker	2-WS-3	185	1	64.6	20	0.56	10.10		37.30		4.720	JN (9.250)	52.00		21.8	1.4	64.70	JN (25.50)	105.0	J (25.50)	14.70	JN (25.50)	184.0	J (25.50)
#ij 80/:	White Suckers	2-WS-4	187	1	78	20	0.94	17.50		62.00		U	(10.70)	79.50		25.3	2.8	U	J (27.10)	174.0	J (27.10)	U	J (27.10)	174.0	J (27.10)
(0/2	hite	2-WS-5	181	1	56.9											23.1	1.8	14.70	N (9.830)	49.40		6.060	JN (9.830)	70.10	<u> </u>
- Site/Landfill ected 10/2/08	≷	2-WS-6	137-153	3	103.4	19	0.83	7.950	J (8.210)	33.80		3.490	JN (8.210)	45.30		22.7	1.1	U	J (31.50)	110.0	J (31.50)	U	J (31.50)	110.0	J (31.50)
ect		2-WS-7	155-158	2	79.9	22	0.51	5.090		21.80		U	(4.210)	26.90		23.1	2.1	U	J (21.60)	93.10	J (21.60)	U	J (21.60)	93.10	J (21.60)
Station 2- Date Colle		2-WS-8	93	1	9.8		0.00	1.70		0.000			(1.110)			25.2	1.6	173.0		396.0		69.40	JN (101.0)	638.0	
<b>Static</b> Date	eq	2-P-1	111-129	6	245.7	24	0.87	1.70		3.870		U	(1.110)	5.580		25.6	3.3	11.50	. (0.000)	25.40	. (0. 600)	U	(5.860)	36.90	. (0.500)
<b>S</b> □	nse ish	2-P-2	92-113	12	290.3	25	1.1	3.390		8.320		U	(2.00)	11.70		26.0	3.4	17.20	J (9.620)	41.50	J (9.620)	U	J (9.620)	58.80	J (9.620)
	mpkinse Sunfish	2-P-3	128-133	5	248.2	25	0.78	1.510		2.40		U	(0.80)	3.90		25.2	2.7	7.70		12.70		U	(3.970)	20.50	1
	Pumpkinseed Sunfish	2-P-4	136-147	6	399.1	26	0.80	1.90		4.50		U	(0.962)	6.380		26.8	4.2	15.90	J (9.330)	41.00	J (9.330)	U	J (9.330)	56.70	J (9.330)
		2-P-5	140-148	5	365.7	22	0.78	2.190		5.090		U	(1.140)	7.270		26.9	3.7	10.50		24.30		U	(40.50)	253.00	
		3-WS-1	207	1	104.5	20	0.57	16.70		60.50		7.050	JN (11.40)	84.00		23.3	1.3	27.60	JN (21.50)	156.0	J (21.50)	19.30	JN (21.50)	203.0	J (21.50)
	ş	3-WS-2	225	1	131.1	24	0.68	7.710	. (=	14.00	. (=	2.650	JN (4.170)	24.40	. (=	23.9	2.2	29.70	JN (20.90)	52.70	J (20.90)	10.70	JN (20.90)	93.30	J (20.90)
ي بو	White Suckers	3-WS-3	324	1	375	21	1.1	11.90	J (7.140)	35.00	J (7.140)	3.410	JN (7.140)	50.50	J (7.140)	24.5	3.2	55.50	J (20.40)	176.0	J (20.40)	16.70	JN (20.40)	248.0	J (20.40)
<b>to Sit</b> /2/08	Sur	3-WS-4	322	1	361.8	21	0.85	23.00	J (23.80)	94.30	J (23.80)	11.00	JN (23.80)	129.00	J (23.80)	22.7	2.1	41.50	J (44.10)	170.0	J (44.10)	21.90	JN (44.10)	234.0	J (44.10)
10/	hite	3-WS-5	352	1	455.7	20	0.92	19.50	J (12.50)	56.00	J (12.50)	5.40	JN (12.50)	81.00	J (12.50)	23.6	4.6	68.20	J (42.40)	199.0	J (42.40)	21.90	JN (42.40)	289.0	J (42.40)
Adjacent to Site ected 10/2/08	≥	3-WS-6	324	1	438.6	20	1.2	31.60	J (25.00)	127.00	J (25.00)	11.20	JN (25.00)	170.00	J (25.00)	23.9	3.2	49.0	J (41.80)	204.0	J (41.80)	18.40	JN (41.80)	272.0	J (41.80)
		3-WS-7	378	1	616.1	20	1.1	14.30		34.80		2.90	JN (7.50)	52.00		24.7	4.8	71.70	J (20.20)	179.0	J (20.20)	15.70	JN (20.20)	266.0	J (20.20)
<u>~</u> ∪ ⊢		3-WS-8 3-P-1	371 94-109	7	602.7 168.4	21 25	0.90 1.2	15.90 10.70		43.80 21.30		3.460 U	JN (7.140) (5.320)	62.90 32.00		24.6 26.8	4.4 3.3	54.90 31.50	J (40.70) J (152.0)	163.0 63.80	J (40.70) J (152.0)	U	J (40.70) J (152.0)	219.0 773.0	J (40.70) J (152.0)
<b>atior</b> Date	pac	3-P-1 3-P-2	115-124	4	159.5	23	1.2	6.390		17.30		2.260	JN (3.950)	26.00		26.8	2.9	28.10	J (345.0)	81.70	J (345.0)	U	J (345.0)	1010.0	J (345.0)
Sta	inse fish	3-P-2 3-P-3	130-136	5	271.4	24	0.84	3.480	$\vdash$	11.50		1.020	JN (3.950) JN (1.90)	16.00		26.8	3.4	25.60	JN (294.0)	87.10	J (345.0)	U	J (345.0) J (294.0)	874.0	J (345.0)
	Pumpkinseed Sunfish	3-P-3 3-P-4	134-141	5	301.0	25	0.84	2.790	$\vdash$	7.840		0.960	JN (2.00)	11.60		25.4	3.4	23.40	JN (294.0) J (147.0)	71.30	J (294.0) J (147.0)	U	J (294.0) J (147.0)	709.0	J (294.0)
	Pur	3-P-5	143-151	5	395.3	23	1.0	4.290		8.740		U.960	(2.170)	13.00		28.1	5.1	32.0	J (147.0)	70.10	J (147.0)	U	J (147.0)	102.0	J (147.0)
$\vdash$		4-WS-1	155	1	41.3	20	0.78	6.150		11.00		U	(3.390)	17.10		23.6	1.8	14.10	3 (17.00)	26.0	3 (17.00)	U	(6.360)	40.10	7 (17.00)
1 I		4-WS-2	172	1	56.2	20	0.78	1.670		3.850		0.645	JN (1.00)	6.150		24.2	0.9	2.50	-	7.070	<b> </b>	1.060	JN (2.070)	10.60	$\vdash$
t l	S	4-WS-3	194	1	82.6	22	0.78	4.770		8.410		0.750	JN (1.850)	14.00		22.4	2.4	23.80	J (11.20)	43.30	J (11.20)	U	J (11.20)	67.0	J (11.20)
r Street 30/08	White Suckers	4-WS-4	205	1	95.3	23	0.78	2.10		4.190		0.730	JN (1.830) JN (0.978)	6.70		24.0	0.8	5.670	3 (11.20)	12.40	3 (11.20)	U	(4.170)	18.10	3 (11.20)
or 5	e St	4-WS-5	207	1	89	24	0.53	3.210		5.790		0.592	JN (1.410)	9.580		22.3	1.4	10.90		20.40		2.10	JN (4.480)	33.50	$\vdash$
Oakmoor lected 9/3	/hit	4-WS-6	250	1	161.6	20	1.2	10.10		15.00		U	(5.00)	25.10		23.8	4.3	48.30	J (21.0)	72.30	J (21.0)	U	J (21.0)	121.0	J (21.0)
<b>Oak</b> ectu	>	4-WS-7	244	1	149.5	23	1.5	9.430		14.00		U	(3.060)	23.40		22.8	3.6	29.30	J (11.0)	41.50	J (11.0)	Ü	J (11.0)	70.60	J (11.0)
		4-WS-8	268	1	212.4	20	0.56	8.80		14.50		U	(5.00)	23.30		22.8	2.7	43.60	J (21.90)	72.80	J (21.90)	U	J (21.90)	117.0	J (21.90)
Station 4- Date Co	9.	4-P-1	98-118	7	213.6	24	1.6	6.580		9.130		0.842	JN (2.080)	16.60		27.9	3.6	20.70	J (8.960)	30.80	J (8.960)	U	J (8.960)	51.60	J (8.960)
Stat De	mpkinsee Sunfish	4-P-2	146-151	3	268.8	27	1.2	5.410		8.070		1.140	JN (1.850)	14.70		26.9	3.8	23.00	J (9.290)	38.70	J (9.290)	5.170	J (9.290)	66.90	J (9.290)
	npk Sun	4-P-3	120-146	5	273.6	22	0.67	2.260		3.510		0.324	JN (0.605)	6.090		26.3	1.6	5.320	3 (3.230)	8.670	3 (3.230)	0.753	J (3.290)	14.80	3 (3.230)
	≥ "		170	,	2.5.0		0.07	2.200		3.310		5.527	(0.003)	5.556		. 20.5	1.0	5.520	1	5.570	·	0.733	3 (2.50)	100	

11	P. P	4-P-4	123-137	5	285.1	22	0.94	2.720	1	4.020	1 1	U	(0.909)	6.730		28.0	4.3	10.60	1	16.40	1	U	(3.570)	27.00	1
		5-WS-1	218	1	111.5	20	0.95	4.530		7.250		0.750	JN (1.770)	12.60		22.2	2.2	13.50		22.30	1	U	(6.760)	35.80	
		5-WS-2	227	1	124.1	20	0.48	2.750		5.30		U	(1.640)	8.050		22.1	2.0	13.70		26.90		U	(6.790)	40.60	
	5	5-WS-3	268	1	224.3	20	1.1	10.10		15.60		U	(5.70)	25.70		22.4	3.0	31.0	J (11.20)	47.30	J (11.20)	U	J (11.20)	78.10	J (11.20)
a	Sucker	5-WS-4	308	1	318	21	0.96	7.050		10.90		U	(2.610)	18.00		21.8	2.7	46.30	J (22.90)	70.20	J (22.90)	U	J (22.90)	117.0	J (22.90)
on Avenue	S S	5-WS-5	331	1	410	21	1.9	0.690		1.690		0.286	JN (0.476)	2.660		25.7	4.5	1.50	3 (22.30)	3.70	3 (22.30)	0.681	JN (0.973)	5.880	3 (22.30)
Ave.	White	5-WS-6	382	1	622.3	21	1.6	15.90		26.40		U	(7.140)	42.30		24.8	4.5	55.20	J (20.20)	89.90	J (20.20)	U	J (20.20)	145.0	J (20.20)
<b>u</b> 6	<u>`</u> ≥	5-WS-7	344	1	499.8	22	1.9	7.640		11.90		U	(4.550)	19.50		24.5	4.7	23.10	J (10.20)	35.60	J (10.20)	U	J (10.20)	58.80	J (10.20)
Clinton		5-WS-8	407	1	702	21	1.7	8.710	J (4.760)	11.90	J (4.760)	U	J (4.760)	20.70	J (4.760)	23.3	5.1	27.80	J (10.20)	37.90	J (10.20)	U	J (10.20)	65.70	J (10.20)
5 e			407	1	702	21	1.7	8.710	3 (4.700)	11.50	3 (4.700)	- 0	3 (4.700)	20.70	3 (4.700)	23.3	3.1	27.80	3 (10.70)	37.30	3 (10.70)		3 (10.70)	03.70	3 (10.70)
Station 5-	Pumpkin- seed	5-P-1	141-160	6	553.0	23	0.74	3.190		6.350		0.687	JN (1.090)	10.20		27.8	3.1	14.60	JN (8.990)	35.20	J (8.990)	3.510	J (8.990)	53.20	J (8.990)
itat	E & S	5-P-2	130-147	6	421.2	23	0.86	2.540		F 120		U	(1.090)	7.70		26.8	2.8	8.540		17.40		U	(2.720)	26.00	
"		5-P-2 5-BG-1	164-171	4	460.6	21	0.72	2.040		5.130 3.110		0.287	JN (0.714)	5.430		26.5	3.9	14.50	J (5.660)	23.40	J (5.660)	U	(3.730) J (5.660)	37.70	J (5.660)
	ue Gill unfish	5-BG-2	170-182	4	509.9	21	0.70	1.970		3.260		U	(0.714)	5.240		27.1	3.6	9.370	3 (3.000)	15.80	3 (3.000)	U	(3.690)	25.10	3 (3.000)
	Blue	5-BG-3	140-163	5	361.3	22	0.83	2.20		3.390		U	(0.909)	5.590		25.0	3.0	7.760		12.70	+	U	(4.00)	20.40	1
$\vdash$	_	6-WS-1	330	1	415.4	20	0.62	5.90		20.10		2.40	JN (5.00)	28.40		21.2	1.6	226.0	J (156.0)	756.0	JN (156.0)	96.30	J (156.0)	1080.0	J (156.0)
	White	6-WS-2	320	1	373.8	20	1.1	7.10		16.50		1,440	JN (3.340)	25.10		22.3	2.3	14.60	J (6.730)	34.10	J (6.730)	3.110	JN (6.730)	51.60	J (6.730)
	White	6-WS-3	255	1	196	22	1.1	2.410		3.710		U	(1.210)	6.140		24.1	3.5	7.340	. (,	11.20	J (4.150)	U	(4.150)	18.50	J (4.150)
		6-C-1	600	1	4019	28	9.0	30.90	J (17.90)	46.10	J (17.90)	U	J (17.90)	77.10	J (17.90)	32.5	6.4	7.050	J (3.080)	10.10	J (3.080)	U	J (3.080)	17.10	J (3.080)
pu		6-C-2	480	1	1834	24	4.1	8.540	.,,	12.70	1, 11,	U	4.170	21.20	. , ,	26.1	3.7	8.20	J (3.830)	12.0	J (3.830)	U	J (3.830)	20.20	J (3.830)
Market Pond	8	6-C-3	550	1	2659	27	4.2	16.80	J (9.260)	37.80	J (9.260)	U	J (9.260)	54.40	J (9.260)	31.4	10.1	36.0	J (31.80)	79.90	J (31.80)	U	J (31.80)	116.0	J (31.80)
rke	2	6-C-4	640	1	4274	24	3.8	20.90	J (20.80)	49.20	J (20.80)	U	J (20.80)	70.00	J (20.80)	28.1	6.7	17.0	<u> </u>	39.10	<u> </u>	U	(17.80)	56.20	
6- New Market Po	Carp	6-C-5	580	1	2800	26	3.2	8.350	J (3.850)	11.50	J (3.850)	U	J (3.850)	19.80	J (3.850)	36.4	10.1	78.00	J (24.80)	106.00	J (24.80)	U	J (24.80)	184.00	J (24.80)
ev ev		6-C-6	420	1	1186	24	4.0	7.040	` ′	11.70	<u> </u>	0.871	JN (2.080)	19.60	<u> </u>	29.6	7.0	50.10	J (21.50)	87.70	J (21.50)	U	J (21.50)	138.00	J (21.50)
6- New	5	6-C-7	330	1	739	24	3.3	5.830		8.880		U	(2.080)	14.70		29.8	8.6	48.10	J (17.50)	72.10	J (17.50)	U	J (17.50)	120.00	J (17.50)
tion (	2	6-C-8	420	1	1107	23	3.1	5.480		8.220		U	(2.170)	13.70		29.9	5.1	44.70		64.20		U	(19.70)	109.00	
Station	등	6-BG-1	165-175	5	552.5	21	0.64	1.320		2.80		U	(0.714)	4.120		26.3	2.7	6.160	J (3.80)	14.60	J (3.80)	U	J (3.80)	20.80	J (3.80)
S	Sunfish	6-BG-2	141-157	5	380.2	21	0.72	1.580		2.410		U	(0.714)	4.00		27.2	2.9	7.350	J (3.680)	11.90	J (3.680)	U	J (3.680)	19.30	J (3.680)
	Gill Sı	6-BG-3	105-132	5	181.9	21	0.68	1.710		2.410		U	(0.733)	4.120		25.5	2.5	6.430		9.650		U	(1.960)	16.10	
	ne Gi	6-BG-4	135-162	5	386.8	21	0.42	0.929		1.350		U	(0.476)	2.280		25.0	2.5	5.520		8.720	1	U	(2.00)	14.30	
	Blu	6-BG-5	153-172	5	457.6	21	0.18	0.283	J (0.238)	0.409	J (0.238)	U	J (0.238)	0.690	J (0.238)	25.4	1.7	3.060		4.570	1	U	(0.984)	7.640	
	9 S	7-WS-1	380	1	657.7	24	3.1	2.870		4.290		U	(2.080)	7.170		24.8	5.4	5.440		8.270		U	(4.030)	13.70	
	White	7-WS-2	340	1	469.6	20	1.3	5.10		7.050		0.650	JN (1.670)	12.90		21.8	2.3	10.40		14.20	1	U	(4.590)	24.60	
	> ns	7-WS-3	355	1	526.3	21	1.9	6.670		9.10		U	(2.380)	15.80		24.4	4.9	19.30		27.50		U	(6.150)	46.70	
		7-C-1	665	1	5070	22	2.7	5.640		11.50	J (2.270)	U	(2.270)	17.10	J (2.270)	30.6	6.6	67.70	J (38.10)	128.00	J (38.10)	U	J (38.10)	195.00	J (38.10)
	,	7-C-2	625	1	3431	24	3.8	0.583	J (0.625)	1.940		0.521	JN (0.625)	3.040		28.5	7.3	1.150	JN (1.750)	4.320	N (1.750)	1.080	J (1.750)	6.560	
7- Spring Lake	2	7-C-3	550	1	2464	24	3.3	8.210		10.30		U	(2.080)	18.50		30.1	7.4	20.30	J (8.310)	27.00	J (8.310)	U	J (8.310)	47.20	J (8.310)
18 L	Carp	7-C-4	570	1	2715	28	8.2	39.60	J (17.90)	62.10	J (17.90)	U	J (17.90)	102.00	J (17.90)	35.8	12.4	61.70	J (14.00)	93.90	J (14.00)	5.890	J (14.00)	161.00	J (14.00)
pri	ු ය	7-C-5	530	1	2004	23	3.7	0.293	J (0.435)	0.970		0.291	JN (0.435)	1.550		31.0	8.1	0.506	JN (0.806)	1.670	N (0.806)	0.452	J (0.806)	2.630	
7- S	2	7-C-6	580	1	3512	23	3.7	0.565	J (0.870)	2.470		0.578	JN (0.870)	3.610		29.2	5.5	0.606	JN (0.856)	2.710		0.644	J (0.856)	3.970	
<u>, 0</u>	3	7-C-7	585	1	2942	26	3.8	0.230	J (0.385)	0.738		0.176	JN (0.385)	1.150		35.0	10.0	0.560	J (0.714)	1.540		0.129	J (0.714)	2.470	
Station 7- Spring Lake Date Collected 10/1/08	are.	7-C-8	570	1	2744	25	4.4	4.360		9.160		U	(4.00)	13.50		28.9	6.1	6.570	J (5.190)	11.60	J (5.190)	U	J (5.190)	18.20	J (5.190)
, 2	lsh.	7-BG-1	155-170	5	488.0	21	0.86	1.60		2.310		U	(0.714)	3.910		28.2	3.1	4.180		6.670		U	(1.770)	10.90	
	Sunfish	7-BG-2	136-160	5	308.3	20	0.74	0.492		1.10		U	(0.294)	1.590		26.1	3.2	2.040		4.480		U	(1.920)	6.510	
	Gill S	7-BG-3	126-140	5	239.8	22	0.67	0.20	J (0.227)	0.298		U	(0.227)	(0.495)		26.0	3.6	1.510		1.940		U	(0.962)	3.450	
		7-BG-4	126-155	5	262.8	21	0.76	0.397		0.767		U	(0.238)	1.170		25.8	3.4	1.450		2.410		U	(0.969)	3.860	
	Blue	7-BG-5	136-160	5	381.8	21	0.49	0.469		0.757		U	(0.238)	1.220		25.7	2.4	2.520		4.090		U	(0.973)	6.610	

U- Not detected

J- Value is estimated

N- Presumptively present

UJ- Not detected and reporting limit is estimated

										Fish Filets (m	ng/kg wet w	veight)							Fisl	n Carcasses (mg	g/kg wet we	eight)			
			Length (mm)	# of Fish/ Sample	Mass (g)	% Solids	% Lipids	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	Aroclor 1260	Qualifier	Total PCBs	Qualifier	% Solids	% Lipids	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	Aroclor 1260	Qualifier	Total PCBs	Qualifier
		1-WS-1	151	1	36.7	21	0.50	0.757		2.150		0.297	JN	3.210		23.5	1.5	3.970		11.80		1.750	JN	17.50	
	s	1-WS-2	184	1	69.9	22	1.4	U	(0.152)	0.136	J	U	(0.152)	0.136	J	23.3	2.2	0.058	JN	0.158		0.0637	JN	0.280	
∞	White Suckers	1-WS-3	219	1	112	21	0.94	0.0286	J J	0.0764		0.0251	JN	0.130		25.1	3.4	0.089	N	0.257		0.0847	N	0.430	
- Reference cted 9/30/08	Suc	1-WS-4	215	1	113.1	20	0.56	0.0210	J	0.0449	J	U	(0.050)	0.0659	J	23.9	3.2	0.108	N	0.213		0.0708	N	0.392	$\vdash$
<b>ere</b> 9/3	ite	1-WS-5	236	1	145.6	20	0.97	0.0293	J	0.0786		U	(0.0654)	0.108		22.9	3.0	0.0764	N	0.197		0.0633	N	0.336	
<b>Ref</b> ted	≶	1-WS-6	277	1	223	20	0.77	0.0279	J	0.0895		0.0275	JN	0.145		22.7	3.2	0.0859	JN	0.287		0.0926	JN	0.466	$\vdash$
Station 1-1 Date Collect		1-WS-7	374	1	559.7	21	1.9	0.0629		0.178		0.0483	JN	0.289		26.1	3.2	0.203	N	0.486		0.144	JN	0.834	$\vdash \vdash \vdash$
ion 1	ъ	1-P-1	134-156	5	433.4	25	1.4	0.0496	J	0.186		0.0599	JN	0.296		25.5	4.0	0.172	JN	0.705		0.209	N	1.090	
<b>Stat</b> i Date	see	1-P-2	96-118	8	245.7	27	2.4	0.0497	J	0.139		0.0494	JN	0.238		28.2	5.6	0.105	N	0.261		0.105	N	0.471	
	Pumpkinseed Sunfish	1-P-3	101-114	7	208.2	24	1.2	0.0521	J	0.0572	J	U	(0.10)	0.109	J	28.2	5.4	0.258	N	0.395		0.138	N	0.790	
	ш ns	1-P-4	120-133	4	196.6	23	1.4	0.0357	J	0.123		0.0347	JN	0.194		26.6	5.2	0.156	N	0.633		0.143	JN	0.932	
	4	1-P-5	79-107	8	162.1	24	2.7	0.0435	J	0.120		0.0511	JN	0.215		36.9	5.4	0.103	N	0.257		0.109	N	0.468	
		2-WS-1	2//	1	222.9	20	0.76	2.320		7.010		0.915	JN	10.20		22.5	2.8	10.90	JN	31.10 21.20	J	4.280	JN	46.30	
	2	2-WS-2 2-WS-3	234 185	1	142.9 64.6	22	1.4 0.56	4.540 2.010	J	15.70 7.450	J	U 0.943	JN	20.30 10.40	J	21.8	1.8 1.4	7.30 14.10	JN	22.90	J	U 3.20	JN	28.50 40.20	
<b>≡</b> 8	cke	2-WS-4	187	1	78	20	0.94	3.490		12.40		U.343	(2.140)	15.90		25.3	2.8	U U	J	43.90	J	U U	J	43.90	-
/Landfill 10/2/08	White Suckers	2-WS-5	181	1	56.9		0.5 .	3.130		12.10		Ů	(2.2.10)	15.50		23.1	1.8	3.40	JN	11.40		1.40	JN	16.20	-
s/La	hite	2-WS-6	137-153	3	103.4	19	0.83	1.510	J	6.430		0.663	JN	8.60		22.7	1.1	U	J	25.0	J	U	J	25.0	J
Site/	≥	2-WS-7	155-158	2	79.9	22	0.51	1.120		4.80		U	(0.926)	5.920		23.1	2.1	U	J	21.50	J	U	J	21.50	J
on 2- Colle		2-WS-8	93	1	9.8											25.2	1.6	2.770		6.340		1.110	JN	10.20	
Station 2- Date Colle	pa	2-P-1	111-129	6	245.7	24	0.87	0.409		0.929		U	(0.267)	1.340		25.6	3.3	2.950		6.50		U	(1.50)	9.450	
<b>Static</b> Date	nser ish	2-P-2	92-113	12	290.3	25	1.1	0.848		2.080		U	(0.50)	2.930		26.0	3.4	4.480	J	10.80	J	U	J	15.30	J
	npkinse Sunfish	2-P-3	128-133	5	248.2	25	0.78	0.377		0.599		U	(0.20)	0.976		25.2	2.7	1.940		3.210		U	(1.0)	5.160	$\sqcup$
	Pumpkinseed Sunfish	2-P-4 2-P-5	136-147 140-148	6	399.1 365.7	26 22	0.80 0.78	0.493 0.482		1.170 1.120		U	(0.250) (0.250)	1.660 1.60		26.8 26.9	4.2 3.7	4.270 2.830	J	11.0 6.530	J	U	J (1.50)	15.20 9.360	J
$\vdash$	Δ.	3-WS-1	207	5 1	104.5	20	0.78	3.340		12.10		1.410	JN	16.80		23.3	1.3	6.430	JN	36.40		4.50	JN	47.30	-
		3-WS-2	225	1	131.1	24	0.68	1.850		3.370		0.636	JN	5.850		23.9	2.2	7.10	JN	12.60	j	2.560	JN	22.30	<del>                                     </del>
	ers	3-WS-3	324	1	375	21	1.1	2.490	J	7.350	J	0.716	JN	10.60	J	24.5	3.2	13.60	J	43.0	J	4.080	JN	60.70	J
Site	White Suckers	3-WS-4	322	1	361.8	21	0.85	4.820	J	19.80	J	2.310	JN	27.00	J	22.7	2.1	9.420	J	38.70	J	4.980	JN	53.10	J
int to Sir 10/2/08	te S	3-WS-5	352	1	455.7	20	0.92	3.90	J	11.20	J	1.080	JN	16.20	J	23.6	4.6	16.10	J	47.0	J	5.180	JN	68.30	J
<b>ent</b> 10,	Ϋ́	3-WS-6	324	1	438.6	20	1.2	6.320	J	25.40	J	2.230	JN	34.00	J	23.9	3.2	11.70	J	48.80	J	4.390	JN	64.90	J
<b>Jace</b> ted		3-WS-7	378	1	616.1	20	1.1	2.850		6.950		0.579	JN	10.40		24.7	4.8	17.70	J	44.20	J	3.870	JN	65.80	J
- <b>Ac</b>		3-WS-8	371	1	602.7	21	0.90	3.330		9.190		0.726	JN	13.20		24.6	4.4	13.50	J	40.20	J	U	J	53.80	J
n 3-	D	3-P-1	94-109	7	168.4	25	1.2	2.680		5.330		U	(1.330)	8.010		26.8	3.3	8.440	J	17.10	J	U	J	25.50	J
Station 3- Adjacent to Site Date Collected 10/2/08	sh	3-P-2	115-124	4	159.5	23	1.1	1.470		3.990		0.519	JN	5.970		26.8	2.9	7.540	J	21.90	J	U	J	29.40	J
\$ _	mpkinse Sunfish	3-P-3	130-136	5	271.4	24	0.84	0.834		2.760		0.245	JN	3.830		26.3	3.4	6.730	JN	22.90	J	U	J	29.70	J
I	Pumpkinseed Sunfish	3-P-4	134-141	5	301.0	25	0.81	0.697		1.960		0.240	JN	2.90		25.4	3.4	5.950	J	18.10	J	U	J	24.10	J
	۵	3-P-5	143-151	5	395.3	23	1.0	0.987		2.010		U	(0.50)	2.990		28.1	5.1	8.990	J	19.70	J	U	J	28.70	J
		4-WS-1	155	1	41.3	20	0.78	1.230		2.190		U	(0.678)	3.420		23.6	1.8	3.330		6.140		U	(1.50)	9.470	
		4-WS-2	172	1	56.2	20	0.50	0.333		0.770		0.129	JN	1.230		24.2	0.9	0.604		1.710		0.257	JN	2.570	
t	ers	4-WS-3	194	1	82.6	22	0.78	1.050		1.850		0.165	JN	3.070		22.4	2.4	5.340	J	9.70	J	U	J	15.0	J
oor Street 9/30/08	White Suckers	4-WS-4	205	1	95.3	23	0.30	0.484		0.964		0.0891	JN	1.540		24.0	0.8	1.360		2.980		U	(1.0)	4.340	
or 5	te S	4-WS-5	207	1	89	24	0.53	0.770		1.390		0.142	JN	2.30	T t	22.3	1.4	2.430		4.560	İ	0.468	JN	7.460	
<b>9</b> 0	۸hi	4-WS-6	250	1	161.6	20	1.2	2.010		2.990		U	(1.00)	5.010	1	23.8	4.3	11.50	J	17.20	J	U	J	28.70	J
4- Oakmoor Collected 9/3	_	4-WS-7	244	1	149.5	23	1.5	2.170		3.220		U	(0.704)	5.390		22.8	3.6	6.670	J	9.460	J	U	J	16.10	J
		4-WS-8	268	1	212.4	20	0.56	1.760		2.90		U	(1.00)	4.660		22.8	2.7	9.930	J	16.60	J	U	J	26.60	J
Station 4- Date Col	D	4-P-1	98-118	7	213.6	24	1.6	1.580		2.190		0.202	JN	3.980		27.9	3.6	5.780	J	8.590	J	U	J	14.40	
Stat Da	ıse6 İsh	4-P-2	146-151	3	268.8	27	1.2	1.460		2.180		0.309	JN	3.960		26.9	3.8	6.20	J	10.40	J	1.390	J	18.0	j
J"	umpkinseed Sunfish	4-P-3	120-146	5	273.6	22	0.67	0.497		0.772		0.0713	JN	1.340		26.3	1.6	1.40		2.280	<u> </u>	0.198	j	3.880	+
I	mn, S	4-P-3 4-P-4	120-146	5	285.1	22	0.67	0.497		0.772		U.U/13	(0.20)	1.480		28.0	4.3	2.980		4.590	-	U.198	(1.0)	7.570	$\vdash$
$\vdash$	Δ.	5-WS-1	218	1	111.5	20	0.94	0.598		1.450		0.150	JN	2.510		22.2	2.2	2.980		4.590	-	U	(1.50)	7.570	$\vdash$
		5-WS-2	227	1	124.1	20	0.48	0.550		1.060		U.130	(0.328)	1.610		22.1	2.0	3.030		5.950		U	(1.50)	8.980	$\vdash \vdash$
11		J-WJ-Z	221	1	124.1	20	0.46	0.550		1.000		U	(0.320)	1.010		22.1	2.0	3.030		5.950	l	U	(1.30)	0.300	لــــــــــــــــــــــــــــــــــــــ

II.	2	5-WS-3	268	1	224.3	20	1.1	2.020	-	3.110	-	U	(1.140)	5.140		22.4	3.0	6.940	1	10.60	J	U	1	17.50	1
	White Suckers	5-WS-4	308	1	318	21	0.96	1.480		2.290		U	(0.549)	3.770		21.8	2.7	10.10	J	15.30	J	U	J	25.40	J
9 u 8	Su		331	1	410	21	1.9	0.145		0.354		0.060	` '	0.559		25.7	4.5	0.386	,	0.952	,	0.175	JN	1.510	J
Avenue /30/08	hite	5-WS-5 5-WS-6	382	1	622.3	21	1.6	3.340		5.550		U.060	JN (1.50)	8.890		24.8	4.5	13.70		22.30	-			36.0	
/ uo	≥		_		_	_	_					U				24.8	4.5		J		J	U	J		J
Clinton		5-WS-7	344	1	499.8	22	1.9	1.680		2.610			(1.00)	4.290			_	5.650	J	8.730	J	U	J	14.40	J
5-C	_	5-WS-8	407	1	702	21	1.7	1.830	J	2.50	J	U	J	4.340	J	23.3	5.1	6.480	J	8.820	J	U	J	15.30	J
<b>9</b>	Pumpkin- seed Sunfish	5-P-1	141-160	6	553.0	23	0.74	0.733		1.460		0.158	JN	2.350		27.8	3.1	4.050	JN	9.780	J.	0.977	J	14.80	J
Station Date C	umpkin seed Sunfish															1							(4.0)		
S		512	130-147 164-171	6 4	421.2 460.6	23 21	0.86	0.585		1.180 0.654		U 0.0603	(0.250)	1.770 1.140		26.8 26.5	2.8 3.9	2.290 3.830		4.670 6.210	-	U	(1.0)	6.960 10.0	
	Blue Gill Sunfish	5-BG-1 5-BG-2	170-182	4	509.9	21	0.72	0.429		0.684		U.0603	JN (0.150)	1.140		27.1	3.6	2.540	J	4.270	J	U	J (1.0)	6.810	J
	lue	5-BG-2 5-BG-3	140-163	5	361.3	22	0.70	0.414		0.745		U	(0.150)	1.230		25.0	3.0	1.940		3.170		U	(1.0)	5.110	
-	_	6-WS-1	330	1	415.4	20	0.62	1.180		4.010		0.480	JN	5.680		21.2	1.6	3.620		12.10	JN	1,540	(1.0) J	17.30	
	ite	6-WS-2	320	1	373.8	20	1.1	1.420		3.30		0.480	JN	5.010		22.3	2.3	3.250	J	7.60	J	0.694	JN	11.50	J
	White Suckers	6-WS-3	255	1	196	22	1.1	0.530		0.817		U.288	(0.267)	1.350		24.1	3.5	1.770	J	2.690	J	U.094	(1.0)	4.460	J
	- 0,	_	600	1	4019	28	9.0	8.660	-	12.90	-	U	(0.267)	21.60		32.5	6.4	2.290	1	3.280	J	U	(1.0)	5.570	J
Þ		6-C-1 6-C-2	480	1	1834	24	4.1	2.050	J	3.040	J	U	(1.00)	5.080	J	26.1	3.7	2.290	J	3.280	J	U	J	5.280	J
Pond (08		6-C-2	550	1	2659	27	4.1	4.540	J	10.20		U	(1.00) J	14.70	J	31.4	10.1	11.30	J	25.10	J	U	J	36.40	J
ket )/1/	_	6-C-4	640	1	4274	24	3.8	5.020	J	11.80	ı	U	J	16.80	J	28.1	6.7	4.750	J	11.0	<u> </u>	U	(5.0)	15.80	J
• Market Po ed 10/1/08	Carp	6-C-5	580	1	2800	26	3.2	2.170	J	2.980	J	U	J	5.150	J	36.4	10.1	7.880	J	10.70	J	U	(3.0) J	18.60	- 1
s v	-	6-C-6	420	1	1186	24	4.0	1.690	,	2.810	,	0.209	JN	4.710	,	29.6	7.0	3.50	j	6.120	j	U	J	9.620	ı
6- Ne		6-C-7	330	1	739	24	3.3	1.40		2.130		U.203	(0.50)	3.530		29.8	8.6	4.120	J	6.180	J	U	J	10.30	J
n 6		6-C-8	420	1	1107	23	3.1	1.260		1.890		U	(0.50)	3.150		29.9	5.1	2.270		3.260	L _	U	(1.0)	5.530	,
Station 6- New Date Collect		6-BG-1	165-175	5	552.5	21	0.64	0.277		0.589		U	(0.150)	0.866		26.3	2.7	1.620		3.830	J	U	(1.0)	5.460	- 1
ş	nfis	6-BG-2	141-157	5	380.2	21	0.72	0.332		0.507		U	(0.150)	0.839		27.2	2.9	2.0	J	3.240	j	Ü	J	5.250	ı
	l Su	6-BG-3	105-132	5	181.9	21	0.68	0.359		0.507		U	(0.154)	0.866		25.5	2.5	1.640		2.460	Ť	Ü	(0.50)	4.10	-
	<u>=</u>	6-BG-4	135-162	5	386.8	21	0.42	0.195		0.284		U	(0.10)	0.479		25.0	2.5	1.380		2.180		U	(0.50)	3.570	
	Blue Gill Sunfish	6-BG-5	153-172	5	457.6	21	0.18	0.0594		0.0859		U	J	0.145	-	25.4	1.7	0.776		1.160		Ü	(0.250)	1.940	
-		7-WS-1	380	1	657.7	24	3.1	0.688		1.030		U	(0.50)	1.720		24.8	5.4	1.350		2.050		U	(1.0)	3.40	
	White Suckers	7-WS-2	340	1	469.6	20	1.3	1.020		1.410		0.130	JN	2.570		21.8	2.3	2.270		3.090		Ü	(1.0)	5.360	
	Suc	7-WS-3	355	1	526.3	21	1.9	1.40		1.910		U	(0.50)	3.320		24.4	4.9	4.720		6.720		U	(1.50)	11.40	
		7-C-1	665	1	5070	22	2.7	1.240		2.520	J	U	(0.50)	3.760	J	30.6	6.6	4.440	J	8.370	J	U	J	12.80	J
		7-C-2	625	1	3431	24	3.8	0.140	J	0.465		0.125	JN	0.730	-	28.5	7.3	0.327	JN	1.230	N	0.309	J	1.870	-
- Spring Lake cted 10/1/08		7-C-3	550	1	2464	24	3.3	1.970	-	2.470		U	(0.50)	4.440		30.1	7.4	6.110	J	8.120	J	U	J	14.20	J
g La 0/1	۵	7-C-4	570	1	2715	28	8.2	11.10		17.40		U	J	28.50	J	35.8	12.4	22.10	j	33.60	j	2.110	j	57.80	J
orin Pd 1	Carp	7-C-5	530	1	2004	23	3.7	0.0674	j	0.223	-	0.067	JN	0.357	-	31.0	8.1	0.157	JN	0.518	N	0.140	J	0.815	-
		7-C-6	580	1	3512	23	3.7	0.130	Ĵ	0.568		0.133	JN	0.830		29.2	5.5	0.177	JN	0.792	† · · ·	0.188	J	1.160	
00 7		7-C-7	585	1	2942	26	3.8	0.0599	j	0.192		0.0457	JN	0.298		35.0	10.0	0.196	J	0.539		0.129	J	0.864	
Station Date Col		7-C-8	570	1	2744	25	4.4	1.090		2.290		U	(1.0)	3.380		28.9	6.1	1.90	i	3.360	J	U	1	5.260	J
S O	ج.	7-BG-1	155-170	5	488.0	21	0.86	0.335		0.486		U	(0.150)	0.821		28.2	3.1	1.180	<u> </u>	1.880		Ü	(0.50)	3.060	-
	Gill Sunfish	7-BG-2	136-160	5	308.3	20	0.74	0.0984		0.220		U	(0.0588	0.318		26.1	3.2	0.532		1.170		U	(0.50)	1.70	
	l Su	7-BG-3	126-140	5	239.8	22	0.67	0.044		0.0655		U	(0.050)	0.109		26.0	3.6	0.392		0.505		Ü	(0.250)	0.897	
	ij	7-BG-4	126-155	5	262.8	21	0.76	0.0834		0.161		U	(0.050)	0.245		25.8	3.4	0.375		0.621	1	U	(0.250)	0.996	
	Blue						-						` ′						<b> </b>		<del>                                     </del>		<u> </u>		
	BIL	7-BG-5	136-160	5	381.8	21	0.49	0.0984		0.159		U	(0.050)	0.257		25.7	2.4	0.647		1.050		U	(0.250)	1.70	

U- Not detected

J- Value is estimated

N- Presumptively present

UJ- Not detected and reporting limit is estimated

										Fish Filets (	mg/kg dry v	veight)							Fis	sh Carcasses (m	g/kg dry w	eight)			
			Length (mm)	# of Fish/	Mass	% Calida	% Linida	4 1 4240	0	A I 4254	0 1:0	4	0	Tabal DCD	0 1:6:	0/ 6 - 11 -1 -	0/ 11-11-	4	0 1:6	4 1 4254	0	412.0	0 1:0	T-1-I DCD-	0
		1-WS-1	151	Sample 1	(g) 36.7	Solids 21	Lipids 0.50	3.60	Qualifier	10.20	Qualifier	1.410	Qualifier JN	Total PCBs 15.30	Qualifier	% Solids 23.5	% Lipids 1.5	16.894	Qualifier	Aroclor 1254 50.213	Qualifier	7.447	Qualifier JN	Total PCBs 74.468	Qualifier
	v	1-WS-2	184	1	69.9	22	1.4	U	(0.691)	0.618	J	U U	(0.691)	0.618	J	23.3	2.2	0.249	JN	0.678		0.273	JN	1.202	$\vdash$
	White Suckers	1-WS-3	219	1	112	21	0.94	0.136	J	0.364		0.120	JN	0.619		25.1	3.4	0.355	N	1.024		0.337	N	1.713	
30/08	Suc	1-WS-4	215	1	113.1	20	0.56	0.105	J	0.225	J	U	(0.250)	0.330	J	23.9	3.2	0.452	N	0.891		0.296	N	1.640	
	hite	1-WS-5	236	1	145.6	20	0.97	0.147	J	0.393		U	(0.327)	0.540		22.9	3.0	0.334	N	0.860		0.276	N	1.470	
1- Refere	≥	1-WS-6	277	1	223	20	0.77	0.140	J	0.448		0.138	JN	0.725		22.7	3.2	0.378	JN	1.260		0.408	JN	2.050	
1-		1-WS-7	374	1	559.7	21	1.9	0.30		0.848		0.230	JN	1.380		26.1	3.2	0.778	N	1.860		0.552	JN	3.20	
Station : Date Coll	p	1-P-1	134-156	5	433.4	25	1.4	0.198	J	0.744		0.240	JN	1.180		25.5	4.0	0.675	JN	2.760		0.820	N	4.270	
Sta Date	sh	1-P-2	96-118	8	245.7	27	2.4	0.184	J	0.515		0.183	JN	0.881		28.2	5.6	0.372	N	0.926		0.372	N	1.670	
-	Pumpkinseed Sunfish	1-P-3	101-114	7	208.2	24	1.2	0.217	J	0.238	J	U	(0.417)	0.454	J	28.2	5.4	0.915	N	1.40		0.489	N	2.80	
	mn, S	1-P-4	120-133	4	196.6	23	1.4	0.155	J	0.535		0.151	JN	0.843		26.6	5.2	0.586	N	2.380		0.538	JN	3.50	$oxed{oxed}$
$\vdash$		1-P-5	79-107	8	162.1	24	2.7	0.181	J	0.50		0.213	JN	0.896		36.9	5.4	0.279	N	0.696		0.295	N	1.270	$\vdash$
		2-WS-1	277 234	1	222.9	20	0.76	11.60		35.10 71.40		4.580 U	JN	51.00 92.30	1	22.5	2.8 1.8	48.40	JN	138.0 95.50	J	19.0	JN	206.0 128.0	J
	rs	2-WS-2 2-WS-3	185	1	142.9 64.6	22	1.4 0.56	20.60 10.10	J	71.40 37.30	J	4.720	JN	92.30 52.00	J	21.8	1.8	32.90 64.70	JN	95.50 105.0	J	U 14.70	JN	128.0	J
_ ∞	White Suckers	2-WS-4	187	1	78	20	0.56	17.50	-	62.00		4.720 U	(10.70)	79.50		25.3	2.8	04.70 U	JN	174.0	J	14.70 U	JIN	174.0	,
Station 2- Site/Landfill Date Collected 10/2/08	ns a	2-WS-5	181	1	56.9	20	0.34	17.50		02.00		U	(10.70)	79.30		23.1	1.8	14.70	N	49.40	,	6,060	JN	70.10	
/Lar 10/	/hit	2-WS-6	137-153	3	103.4	19	0.83	7.950	J	33.80		3.490	JN	45.30		22.7	1.1	U	J	110.0	J	U	J	110.0	
Site.	>	2-WS-7	155-158	2	79.9	22	0.51	5.090	Ť	21.80		U	(4.210)	26.90		23.1	2.1	U	j	93.10	J	Ü	J	93.10	
2-3		2-WS-8	93	1	9.8							-	( -/			25.2	1.6	173.0		396.0		69.40	JN	638.0	
e C	75	2-P-1	111-129	6	245.7	24	0.87	1.70		3.870		U	(1.110)	5.580		25.6	3.3	11.50		25.40		U	(5.860)	36.90	
<b>Statio</b> Date	seec h	2-P-2	92-113	12	290.3	25	1.1	3.390		8.320		U	(2.00)	11.70		26.0	3.4	17.20	J	41.50	J	U	J	58.80	J
	mpkinse Sunfish	2-P-3	128-133	5	248.2	25	0.78	1.510		2.40		U	(0.80)	3.90		25.2	2.7	7.70		12.70		U	(3.970)	20.50	
	Pumpkinseed Sunfish	2-P-4	136-147	6	399.1	26	0.80	1.90		4.50		U	(0.962)	6.380		26.8	4.2	15.90	J	41.00	J	U	J	56.70	J
	۵	2-P-5	140-148	5	365.7	22	0.78	2.190		5.090		U	(1.140)	7.270		26.9	3.7	10.50		24.30		U	(40.50)	253.00	
		3-WS-1	207	1	104.5	20	0.57	16.70		60.50		7.050	JN	84.00		23.3	1.3	27.60	JN	156.0	J	19.30	JN	203.0	J
	S	3-WS-2	225	1	131.1	24	0.68	7.710		14.00		2.650	JN	24.40		23.9	2.2	29.70	JN	52.70	J	10.70	JN	93.30	J
te	White Suckers	3-WS-3	324	1	375	21	1.1	11.90	J	35.00	J	3.410	JN	50.50	J	24.5	3.2	55.50	J	176.0	J	16.70	JN	248.0	J
2/08	Suc	3-WS-4	322	1	361.8	21	0.85	23.00	J	94.30	J	11.00	JN	129.00	J	22.7	2.1	41.50	J	170.0	J	21.90	JN	234.0	J .
<b>jacent to Si</b> t ted 10/2/08	hite	3-WS-5 3-WS-6	352 324	1	455.7 438.6	20	0.92 1.2	19.50	J	56.00 127.00	J	5.40 11.20	JN	81.00 170.00	J	23.6 23.9	4.6 3.2	68.20 49.0	J	199.0 204.0	J	21.90 18.40	JN JN	289.0 272.0	_ J
jace ted	≥	3-WS-7	378	1	616.1	20	1.1	31.60 14.30	J	34.80	J	2.90	JN	52.00	J	24.7	4.8	71.70	J	179.0	J	15.70	JN	266.0	
- Ad		3-WS-7	378	1	602.7	21	0.90	15.90	<del>                                     </del>	43.80		3,460	JN	62.90		24.7	4.8	54.90	J	163.0	J	15.70 U	JIN	219.0	-
Station 3- Adjacent to Site Date Collected 10/2/08		3-W3-6	94-109	7	168.4	25	1.2	10.70	<del>                                     </del>	21.30		J.460	(5.320)	32.00		26.8	3.3	31.50	J	63.80	J	U	J	773.0	J
a <b>tio</b> n Date	Pumpkinseed Sunfish	3-P-2	115-124	4	159.5	23	1.1	6.390		17.30		2.260	JN	26.00		26.8	2.9	28.10	J	81.70	J	U	J	1010.0	<u> </u>
S	npkinse Sunfish	3-P-3	130-136	5	271.4	24	0.84	3.480		11.50		1.020	JN	16.00		26.3	3.4	25.60	JN	87.10	J	U	J	874.0	J
	ns	3-P-4	134-141	5	301.0	25	0.81	2.790	ĺ	7.840		0.960	JN	11.60		25.4	3.4	23.40	J	71.30	J	U	J	709.0	J
	4	3-P-5	143-151	5	395.3	23	1.0	4.290		8.740		U	(2.170)	13.00		28.1	5.1	32.0	J	70.10	J	U	J	102.0	J
		4-WS-1	155	1	41.3	20	0.78	6.150		11.00		U	(3.390)	17.10		23.6	1.8	14.10		26.0		U	(6.360)	40.10	
		4-WS-2	172	1	56.2	20	0.50	1.670		3.850		0.645	JN	6.150		24.2	0.9	2.50		7.070		1.060	JN	10.60	
eet 8	kers	4-WS-3	194	1	82.6	22	0.78	4.770		8.410		0.750	JN	14.00		22.4	2.4	23.80	J	43.30	J	U	J	67.0	J
Oakmoor Street lected 9/30/08	White Suckers	4-WS-4	205	1	95.3	23	0.30	2.10		4.190		0.387	JN	6.70		24.0	0.8	5.670		12.40		U	(4.170)	18.10	igsquare
100r 9/3	hite	4-WS-5	207	1	89	24	0.53	3.210		5.790		0.592	JN (= aa)	9.580		22.3	1.4	10.90	<u> </u>	20.40	<u> </u>	2.10	JN	33.50	لــــــــا
. 4- Oakm Collected	≶	4-WS-6	250	1	161.6	20	1.2	10.10	<u> </u>	15.00		U	(5.00)	25.10		23.8	4.3	48.30	J	72.30	J	U	J	121.0	J
		4-WS-7 4-WS-8	244	1	149.5	23	1.5	9.430		14.00		U	(3.060)	23.40		22.8	3.6	29.30	J	41.50	J	U	J	70.60	J
	ъ	_	268	7	212.4	20	0.56	8.80		14.50 9.130		U 0.842	(5.00)	23.30		22.8 27.9	2.7	43.60	J	72.80	J	U	J	117.0	J
<b>tatior</b> Date	see	4-P-1	98-118		213.6	24	1.6	6.580	<b>-</b>				JN	16.60			3.6	20.70	J	30.80		<u> </u>		51.60	-
Ġ	mpkinseed Sunfish	4-P-2	146-151	3	268.8	27	1.2	5.410		8.070		1.140	JN	14.70		26.9	3.8	23.00	J	38.70	J	5.170	J	66.90	J
ll l	S.	4-P-3	120-146	5	273.6	22	0.67	2.260		3.510		0.324	JN	6.090		26.3	1.6	5.320	l	8.670	l	0.753	J	14.80	

11	D.	4-P-4	123-137	5	285.1	22	0.94	2.720		4.020		U	(0.909)	6.730	1	28.0	4.3	10.60	ı	16.40	1	U	(3.570)	27.00	
-		5-WS-1	218	1	111.5	20	0.95	4.530		7.250		0.750	JN	12.60		22.2	2.2	13.50		22.30		Ü	(6.760)	35.80	
		5-WS-2	227	1	124.1	20	0.48	2.750		5.30		U	(1.640)	8.050		22.1	2.0	13.70		26.90		U	(6.790)	40.60	
	2	5-WS-3	268	1	224.3	20	1.1	10.10		15.60		U	(5.70)	25.70		22.4	3.0	31.0	J	47.30	J	U	J	78.10	
	Sucker	5-WS-4	308	1	318	21	0.96	7.050		10.90		U	(2.610)	18.00		21.8	2.7	46.30	j	70.20	1	U	i	117.0	1
9/30/08	e St	5-WS-5	331	1	410	21	1.9	0.690		1.690		0.286	JN	2.660		25.7	4.5	1.50		3.70		0.681	JN	5.880	
Ave '30,	White	5-WS-6	382	1	622.3	21	1.6	15.90		26.40		U	(7.140)	42.30		24.8	4.5	55.20	J	89.90	J	U.001	J	145.0	1
u /6 p		5-WS-7	344	1	499.8	22	1.9	7.640		11.90		U	(4.550)	19.50		24.5	4.7	23.10	J	35.60	J	U	J	58.80	J
Clinton		5-WS-8	407	1	702	21	1.7	8.710	J	11.90	J	U	(4.330)	20.70		23.3	5.1	27.80	J	37.90	J	U	J	65.70	J
9le		J-WJ-8	407	1	702	21	1.7	8.710	,	11.50	,	0	,	20.70	,	23.3	3.1	27.80	,	37.50	,	-	,	03.70	,
tation 5-	umpkin seed Sunfish	5-P-1	141-160	6	553.0	23	0.74	3.190		6.350		0.687	JN	10.20		27.8	3.1	14.60	JN	35.20	J	3.510	J	53.20	J
Station 5-	Pumpkin- seed Sunfish	5-P-2	130-147	6	421.2	23	0.86	2.540		5.130		U	(1.090)	7.70		26.8	2.8	8.540		17.40		U	(3.730)	26.00	
		5-BG-1	164-171	4	460.6	21	0.72	2.040		3.110		0.287	JN	5.430		26.5	3.9	14.50	J	23.40	J	Ü	J	37.70	J
	ue Gill unfish	5-BG-2	170-182	4	509.9	21	0.70	1.970		3.260		U	(0.714)	5.240		27.1	3.6	9.370		15.80		U	(3.690)	25.10	
	Blue Sunf	5-BG-3	140-163	5	361.3	22	0.83	2.20		3,390		U	(0.909)	5.590		25.0	3.0	7.760		12.70		U	(4.00)	20.40	
	a, s	6-WS-1	330	1	415.4	20	0.62	5.90		20.10		2.40	JN	28.40		21.2	1.6	226.0	J	756.0	JN	96.30	J	1080.0	J
	White	6-WS-2	320	1	373.8	20	1.1	7.10		16.50		1.440	JN	25.10		22.3	2.3	14.60	J	34.10	J	3.110	JN	51.60	J
	Su ≪	6-WS-3	255	1	196	22	1.1	2.410		3.710		U	(1.210)	6.140		24.1	3.5	7.340		11.20	J	U	(4.150)	18.50	J
		6-C-1	600	1	4019	28	9.0	30.90	J	46.10	J	U	J	77.10	J	32.5	6.4	7.050	J	10.10	J	U	J	17.10	J
Б		6-C-2	480	1	1834	24	4.1	8.540		12.70		U	4.170	21.20		26.1	3.7	8.20	J	12.0	J	U	J	20.20	J
Market Pond ed 10/1/08		6-C-3	550	1	2659	27	4.2	16.80	J	37.80	J	U	J	54.40	J	31.4	10.1	36.0	J	79.90	J	U	J	116.0	J
10/1	٠ و	6-C-4	640	1	4274	24	3.8	20.90	J	49.20	J	U	J	70.00	J	28.1	6.7	17.0		39.10		U	(17.80)	56.20	
6- New Market Po Collected 10/1/08	Carp	6-C-5	580	1	2800	26	3.2	8.350	J	11.50	J	U	J	19.80	J	36.4	10.1	78.00	J	106.00	J	U	J	184.00	J
6- New		6-C-6	420	1	1186	24	4.0	7.040		11.70		0.871	JN	19.60		29.6	7.0	50.10	J	87.70	J	U	J	138.00	J
<u>.</u> 8		6-C-7	330	1	739	24	3.3	5.830		8.880		U	(2.080)	14.70		29.8	8.6	48.10	J	72.10	J	U	J	120.00	J
Station (		6-C-8	420	1	1107	23	3.1	5.480		8.220		U	(2.170)	13.70		29.9	5.1	44.70		64.20		U	(19.70)	109.00	
tat	-R	6-BG-1	165-175	5	552.5	21	0.64	1.320		2.80		U	(0.714)	4.120		26.3	2.7	6.160	J	14.60	J	U	J	20.80	J
J 5	Sunfish	6-BG-2	141-157	5	380.2	21	0.72	1.580		2.410		U	(0.714)	4.00		27.2	2.9	7.350	J	11.90	J	U	J	19.30	J
	Gill S	6-BG-3	105-132	5	181.9	21	0.68	1.710		2.410		U	(0.733)	4.120		25.5	2.5	6.430		9.650		U	(1.960)	16.10	
	ne G	6-BG-4	135-162	5	386.8	21	0.42	0.929		1.350		U	(0.476)	2.280		25.0	2.5	5.520		8.720		U	(2.00)	14.30	
	Blu	6-BG-5	153-172	5	457.6	21	0.18	0.283	J	0.409	J	U	J	0.690	J	25.4	1.7	3.060		4.570		U	(0.984)	7.640	
	e rs	7-WS-1	380	1	657.7	24	3.1	2.870		4.290		U	(2.080)	7.170		24.8	5.4	5.440		8.270		U	(4.030)	13.70	
	White	7-WS-2	340	1	469.6	20	1.3	5.10		7.050		0.650	JN	12.90		21.8	2.3	10.40		14.20		U	(4.590)	24.60	
	> 'n	7-WS-3	355	1	526.3	21	1.9	6.670		9.10		U	(2.380)	15.80		24.4	4.9	19.30		27.50		U	(6.150)	46.70	
		7-C-1	665	1	5070	22	2.7	5.640		11.50	J	U	(2.270)	17.10	J	30.6	6.6	67.70	J	128.00	J	U	J	195.00	J
m ∞		7-C-2	625	1	3431	24	3.8	0.583	J	1.940		0.521	JN	3.040		28.5	7.3	1.150	JN	4.320	N	1.080	J	6.560	
7- Spring Lake		7-C-3	550	1	2464	24	3.3	8.210		10.30		U	(2.080)	18.50		30.1	7.4	20.30	J	27.00	J	U	J	47.20	J
ng   10/	Carp	7-C-4	570	1	2715	28	8.2	39.60	J	62.10	J	U	J	102.00	J	35.8	12.4	61.70	J	93.90	J	5.890	J	161.00	J
spri ted	ొ	7-C-5	530	1	2004	23	3.7	0.293	J	0.970		0.291	JN	1.550		31.0	8.1	0.506	JN	1.670	N	0.452	J	2.630	
7-5 lled		7-C-6	580	1	3512	23	3.7	0.565	J	2.470		0.578	JN	3.610		29.2	5.5	0.606	JN	2.710		0.644	J	3.970	
<u>io</u> 0		7-C-7	585	1	2942	26	3.8	0.230	J	0.738		0.176	JN	1.150		35.0	10.0	0.560	J	1.540		0.129	J	2.470	
Station 7- Spring Lake Date Collected 10/1/08		7-C-8	570	1	2744	25	4.4	4.360		9.160		U	(4.00)	13.50		28.9	6.1	6.570	J	11.60	J	U	J	18.20	J
" "	ish	7-BG-1	155-170	5	488.0	21	0.86	1.60		2.310		U	(0.714)	3.910		28.2	3.1	4.180		6.670		U	(1.770)	10.90	
	Sunfish	7-BG-2	136-160	5	308.3	20	0.74	0.492		1.10		U	(0.294)	1.590		26.1	3.2	2.040		4.480		U	(1.920)	6.510	
	Gill S	7-BG-3	126-140	5	239.8	22	0.67	0.20	J	0.298		U	(0.227)	(0.495)		26.0	3.6	1.510		1.940		U	(0.962)	3.450	
	Blue G	7-BG-4	126-155	5	262.8	21	0.76	0.397		0.767		U	(0.238)	1.170		25.8	3.4	1.450		2.410		U	(0.969)	3.860	
	Ble	7-BG-5	136-160	5	381.8	21	0.49	0.469		0.757		U	(0.238)	1.220		25.7	2.4	2.520		4.090		U	(0.973)	6.610	

U- Not detected

J- Value is estimated

N- Presumptively present

UJ- Not detected and reporting limit is estimated

### Cornell Dublier (WA #0-360)

Asiatic Clams

									Cla	ms (mg/kg	wet weight)						Clar	ns (mg/kg	dry weight)			
	Replicate	# of Individuals	Size Range (mm)	Mass (g)	% Solids	% Lipids	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	Aroclor 1260	Qualifier	Total PCBs	Qualifier	Aroclor 1248	Qualifier	Aroclor 1254	Qualifier	Aroclor 1260	Qualifier	Total PCBs	Qualifier
11-	1	124	9-21	24.5	8.6	0.86	U	(0.20)	U	(0.20)	U	(0.20)	U	(0.20)	U	(2.310)	U	(2.310)	U	(2.310)	U	(2.310)
Station Referen	2	197	8-20	53.5	9.6	0.82	U	(0.05)	0.062	N	U	(0.05)	0.0618		U	(0.522)	0.645	N	U	(0.522)	0.645	
Static	3	64	21-30	50.4	9.9	0.89	U	(0.10)	0.112	N	U	(0.10)	0.112		U	(1.010)	1.140	N	U	(1.010)	1.140	
n 2- ./ fill	1	186	12-16	51.2	10	0.7	0.591		1.290		U	(0.25)	1.880		0.591		12.800		U	(2.490)	18.700	
ation Site/ andfi	2	79	16-21	53.5	9.8	0.8	0.985		2.050		U	(0.50)	3.040		10.10		21.00		U	(5.120)	31.10	
Sta	3	25	22-29	50.9	9.6	0.86	0.932		2.170		U	(0.40)	3.110		9.740		22.70		U	(4.180)	32.50	
n 3- ent te	1	272	9-18	80.8	8.6	0.56	0.556		1.400		U	(0.25)	1.960		6.450		16.20		U	(2.90)	22.70	
tation Adjace to Sit	2	167	19-23	205	8.1	0.76	1.00	J	2.760	J	U	J	3.760	J	12.40	J	34.20	J	U	J	46.60	J
Sta Ad to	3	170	24-31	204	7	0.54	0.601		1.540		0.107	JN	2.250		8.610		22.10		1.530	JN	32.20	
n 4- oor et	1	320	9-17	70	11	1.1	0.926		1.640		U	(0.50)	2.560		8.80		15.60		U	(4.750)	24.30	
tation akmo Stree	2	82	17-20	49.8	11	0.72	0.836		1.580		U	(0.50)	2.410		7.680		14.50		U	(4.60)	22.20	
Sta Oal St	3	69	20-27	108	8.4	0.56	0.612		1.270		U	(0.25)	1.880		7.250		15.00		U	(2.960)	22.30	
ה 5- on ue	1	67	10-19	54.5	8.4	0.65	0.892		1.660		U	(0.50)	2.550		10.70	•	19.90		U	(5.990)	30.50	
Station Clintor Avenu	2	47	19-24	55	9.6	1.1	1.16		2.250		U	(0.50)	3.410		12.10		23.40		U	(5.20)	35.40	
Sta CI A	3	22	24-32	53.9	8	0.74	1.09		2.040		U	(0.50)	3.120		13.60		25.40		U	(6.230)	38.90	

mg/kg -milligrams per kilogram

MS/MSD - matrix spike/ matrix spike duplicate

U - undetected J - estimated

N -

JN -

UJ -

Note: the number in parentheses in the 'Qualifier' column is the reporting limit

PCB Accumulation in Asiatic Clams

Area Station	Replicate
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	Station	перпсисс				
			Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
		1	0.00	0.00	0.00	0
Area 1	Station 1	2	0.00	0.06	0.00	0.0618
		3	0.00	0.11	0.00	0.112
		1	0.591	1.29	0	1.88
	Station 2	2	0.985	2.05	0	3.04
Area 2		3	0.932	2.17	0	3.11
Alea Z		1	0.556	1.4	0	1.96
	Station 3	2	1	2.76	0	3.76
		3	0.601	1.54	0.107	2.25
		1	0.926	1.64	0	2.56
	Station 4	2	0.836	1.58	0	2.41
Area 3		3	0.612	1.27	0	1.88
Aled 5		1	0.892	1.66	0	2.55
	Station 5	2	1.16	2.25	0	3.41
		3	1.09	2.04	0	3.12

### PCB Accumulation in Sunfish

Area	Station	Replicate				File	et			Card	ass			Whole Body Co	ncentrations	
			Filet wt (g)	Carcass wt (g)	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
		1-P-1	63.2	358.1	0.0496	0.186	0.0599	0.296	0.172	0.705	0.209	1.09	0.153638547	0.62714384	0.18663323	0.9708906
		1-P-2	40.74	193.89	0.0497	0.139	0.0494	0.238	0.105	0.261	0.105	0.471	0.09539798	0.23981652	0.095345889	0.430543
Area 1	Station 1	1-P-3	34.97	161.93	0.0521	0.0572	0	0.109	0.258	0.395	0.138	0.79	0.221431574	0.335005759	0.113490808	0.6690525
		1-P-4	32.13	157.22	0.0357	0.123	0.0347	0.194	0.156	0.633	0.143	0.932	0.135586802	0.546460259	0.124623031	0.8067719
		1-P-5	27.39	126.74	0.0435	0.12	0.0511	0.215	0.103	0.257	0.109	0.468	0.092426426	0.232654123	0.098710757	0.4230401
		2-P-1	39.99	196.39	0.409	0.929	0	1.34	2.95	6.5	0	9.45	2.52012188	5.55751633	0	8.0779766
		2-P-2	55.18	231.08	0.848	2.08	0	2.93	4.48	10.8	0	15.3	3.779889052	9.119116887	0	12.915536
	Station 2	2-P-3	40.90	199.36	0.377	0.599	0	0.976	1.94	3.21	0	5.16	1.673926996	2.765523599	0	4.4477483
		2-P-4	66.65	316.58	0.493	1.17	0	1.66	4.27	11	0	15.2	3.61311758	9.290401326	0	12.845171
Aron 2		2-P-5	157.16	288.84	0.482	1.12	0	1.6	2.83	6.53	0	9.36	2.002619552	4.623642152	0	6.625557
Area 2		3-P-1	29.04	131.94	2.68	5.33	0	8.01	8.44	17.1	0	25.5	7.400924338	14.97674991	0	22.34489
		3-P-2	23.55	127.27	1.47	3.99	0.519	5.97	7.54	21.9	0	29.4	6.592191354	19.10341798	0.081039981	25.74149
	Station 3	3-P-3	39.05	221.94	0.834	2.76	0.245	3.83	6.73	22.9	0	29.7	5.847825204	19.88660102	0.036657535	25.829264
		3-P-4	46.51	241.54	0.697	1.96	0.24	2.9	5.95	18.1	0	24.1	5.101824232	15.49395452	0.038751606	20.676942
		3-P-5	61.49	312.51	0.987	2.01	0	2.99	8.99	19.7	0	28.7	7.674212647	16.79155588	0	24.472974
		4-P-1	42.73	157.44	1.58	2.19	0.202	3.98	5.78	8.59	0	14.4	4.883432083	7.223801269	0.043120647	12.175658
	Station 4	4-P-2	46.48	206.13	1.46	2.18	0.309	3.96	6.2	10.4	1.39	18	5.327844503	8.88752781	1.191097027	15.416653
	Station 4	4-P-3	49.29	208.26	0.497	0.772	0.0713	1.34	1.4	2.28	0.198	3.88	1.227183576	1.991398486	0.173752114	3.393894
		4-P-4	41.88	225.81	0.598	0.884	0	1.48	2.98	4.59	0	7.57	2.607336994	4.010197691	0	6.6172218
Area 3		5-P-1	75.68	436.06	0.733	1.46	0.158	2.35	4.05	9.78	0.977	14.8	3.559456834	8.549575175	0.855880056	12.958799
		5-P-2	63.43	321.78	0.585	1.18	0	1.77	2.29	4.67	0	6.96	2.009248851	4.095324628	0	6.1053968
	Station 5	5-BG-1	64.41	359.19	0.429	0.654	0.0603	1.14	3.83	6.21	0	10	3.312864943	5.365188952	0.009168846	8.6528031
		5-BG-2	78.67	400.57	0.414	0.684	0	1.1	2.54	4.27	0	6.81	2.191004883	3.681337493	0	5.8726707
		5-BG-3	55.54	284.46	0.484	0.745	0	1.23	1.94	3.17	0	5.11	1.702158118	2.773869118	0	4.4761906
		6-BG-1	82.55	441.80	0.277	0.589	0	0.866	1.62	3.83	0	5.46	1.408567464	3.319759607	0	4.7367527
		6-BG-2	62.63	293.43	0.332	0.507	0	0.839	2	3.24	0	5.25	1.706603269	2.759272623	0	4.4741169
Area 4	Station 6	6-BG-3	29.42	141.01	0.359	0.507	0	0.866	1.64	2.46	0	4.1	1.418870973	2.122868861	0	3.5417398
		6-BG-4	67.93	304.36	0.195	0.284	0	0.479	1.38	2.18	0	3.57	1.16377864	1.834045824	0	3.0059998
		6-BG-5	74.70	668.53	0.0594	0.0859	0	0.145	0.776	1.16	0	1.94	0.703976508	1.052045168	0	1.7595895
		7-BG-1	84.81	383.00	0.335	0.486	0	0.821	1.18	1.88	0	3.06	1.02680864	1.627279579	0	2.6540882
		7-BG-2	54.17	237.06	0.0984	0.22	0	0.318	0.532	1.17	0	1.7	0.451348584	0.99329602	0	1.4429422
Area 5	Station 7	7-BG-3	43.78	187.05	0.044	0.0655	0	0.109	0.392	0.505	0	0.897	0.325997141	0.421642941	0	0.7475452
		7-BG-4	45.28	204.75	0.0834	0.161	0	0.245	0.375	0.621	0	0.996	0.322191745	0.537694797	0	0.8599952
		7-BG-5	62.89	301.24	0.0984	0.159	0	0.257	0.647	1.05	0	1.7	0.552249625	0.89611268	0	1.4507751

Sunfish species include Blue Gills and Pumpkinseed

### PCB Accumulation in White Suckers

area	station	replicate	Fillet wt (g)		File	ts		area	station	replicate
				Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs			
		1-WS-1	3.02	0.757	2.15	0.297	3.21			1-WS-1
		1-WS-2	7.35	0	0.136	0	0.136			1-WS-2
		1-WS-3	23.9	0.0286	0.0764	0.0251	0.13			1-WS-3
Area 1	Station 1	1-WS-4	23.27	0.021	0.0449	0	0.0659	Area 1	Station 1	1-WS-4
		1-WS-5	26.59	0.0293	0.0786	0	0.108			1-WS-5
		1-WS-6	39.89	0.0279	0.0895	0.0275	0.145			1-WS-6
		1-WS-7	92.95	0.0629	0.178	0.0483	0.289			1-WS-7
		2-WS-1	41.21	2.32	7.01	0.915	10.2			2-WS-1
		2-WS-2	23.47	4.54	15.7	0	20.3			2-WS-2
	Station 2	2-WS-3	12.68	2.01	7.45	0.943	10.4			2-WS-3
	Station 2	2-WS-4	16.16	3.49	12.4	0	15.9		Station 2	2-WS-4
		2-WS-6	15.25	1.51	6.43	0.663	8.6		Station 2	2-WS-5
		2-WS-7	13.13	1.12	4.8	0	5.92			2-WS-6
Area 2		3-WS-1	14.84	3.34	12.1	1.41	16.8			2-WS-7
Aled 2		3-WS-2	24.12	1.85	3.37	0.636	5.85	Area 2		2-WS-8
		3-WS-3	69.98	2.49	7.35	0.716	10.6	Alea 2		3-WS-1
	Station 3	3-WS-4	67.4	4.82	19.8	2.31	27			3-WS-2
	Stations	3-WS-5	74.82	3.9	11.2	1.08	16.2			3-WS-3
		3-WS-6	68.9	6.32	25.4	2.23	34		Station 3	3-WS-4
		3-WS-7	88.66	2.85	6.95	0.579	10.4		Station 5	3-WS-5
		3-WS-8	86.02	3.33	9.19	0.726	13.2			3-WS-6
		4-WS-1	7.82	1.23	2.19	0	3.42			3-WS-7
		4-WS-2	11.66	0.333	0.77	0.129	1.23			3-WS-8
		4-WS-3	11.41	1.05	1.85	0.165	3.07			4-WS-1
	Station 4	4-WS-4	19.07	0.484	0.964	0.0891	1.54			4-WS-2
	Station 1	4-WS-5	15.73	0.77	1.39	0.142	2.3			4-WS-3
		4-WS-6	32.06	2.01	2.99	0	5.01		Station 4	4-WS-4
		4-WS-7	30.5	2.17	3.22	0	5.39		Station 4	4-WS-5
Area 3		4-WS-8	43.55	1.76	2.9	0	4.66			4-WS-6
711 Cu 5		5-WS-1	23.94	0.906	1.45	0.15	2.51			4-WS-7
		5-WS-2	22.1	0.55	1.06	0	1.61	Area 3		4-WS-8
		5-WS-3	35.92	2.02	3.11	0	5.14	711000		5-WS-1
	Station 5	5-WS-4	60.97	1.48	2.29	0	3.77			5-WS-2
		5-WS-5	46.59	0.145	0.354	0.06	0.559			5-WS-3
		5-WS-6	96.79	3.34	5.55	0	8.89		Station 5	5-WS-4
		5-WS-7	76.26	1.68	2.61	0	4.29		510110115	5-WS-5
		5-WS-8	96.9	1.83	2.5	0	4.34			5-WS-6
		6-WS-1	61.65	1.18	4.01	0.48	5.68			5-WS-7
Area 4	Station 6		48.53	1.42	3.3	0.288	5.01			5-WS-8
		6-WS-3	39.54	0.53	0.817	0	1.35			6-WS-1
		7-WS-1	108.34	0.688	1.03	0	1.72	Area 4	Station 6	
Area 5	Station 7	7-WS-2	73.91	1.02	1.41	0.13	2.57			6-WS-3
		7-WS-3	77.76	1.4	1.91	0	3.32			7-WS-1
								Area 5	Station 7	
										7-WS-3

area	station	replicate	carcass wt (g)		Carc	ass			Whole Body Co	ncentrations	
				Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
		1-WS-1	28.33	3.97	11.8	1.75	17.5	3.660486124	10.87039872	1.610029984	16.123419
		1-WS-2	52.91	0.058	0.158	0.0637	0.28	0.050925655	0.155316628	0.055930418	0.2624361
		1-WS-3	81.7	0.089	0.257	0.0847	0.43	0.075329924	0.216125568	0.071210985	0.3621023
Area 1	Station 1	1-WS-4	84.58	0.108	0.213	0.0708	0.392	0.089228651	0.176730301	0.055524006	0.3216398
		1-WS-5	109.79	0.0764	0.197	0.0633	0.336	0.067216916	0.173915559	0.050958403	0.2915469
		1-WS-6	173.52	0.0859	0.287	0.0926	0.466	0.075058802	0.250083853	0.08043169	0.4059996
		1-WS-7	443.35	0.203	0.486	0.144	0.834	0.178718264	0.432618311	0.127413547	0.7395421
		2-WS-1	169	10.9	31.1	4.28	46.3	9.217959184	26.37734694	3.620318491	39.222882
		2-WS-2	114.65	7.3	21.2	0	28.5	6.831007819	20.26541413	0	27.106617
		2-WS-3	47.47	14.1	22.9	3.2	40.2		19.64304239	2.724210141	33.917972
	Station 2	2-WS-4	56.13	0	43.9	0	43.9		36.85836215	0	37.640766
	50000112	2-WS-5	42.73	3.4	11.4	1.40	16.2		10.09278199		
		2-WS-6	75.72	0	25	0	25	0.165510411	22.01490152	0	22.180412
		2-WS-7	60.25	0	21.5	0	21.5		19.64228259		
Area 2		2-WS-8	n/a	2.77	6.34	1.11	10.2	0	0	0	0
711 CO 2		3-WS-1	80.24	6.43	36.4	4.5	47.3	4.594550659	22.86705499	2.737223273	30.203302
		3-WS-2	97.11	7.1	12.6	2.56	22.3		15.54985107		
		3-WS-3	286.34	13.6	43	4.08	60.7		36.41212759		
	Station 3	3-WS-4	274.09	9.42	38.7	4.98	53.1		36.02828945		
		3-WS-5	357.46	16.1	47	5.18	68.3		39.04063257		
		3-WS-6	348.85	11.7	48.8	4.39	64.9		40.9648948	3.665237933	
		3-WS-7	502.75	17.7	44.2	3.87	65.8		43.5565658		
		3-WS-8	490.41	13.5	40.2	0	53.8		39.28428347		
		4-WS-1	30.61	3.33	6.14	0	9.47		4.975104712		
		4-WS-2	38.67	0.604	1.71	0.257	2.57		1.463615864		
		4-WS-3	62.1	5.34	9.7	0	15		8.020489528		
	Station 4	4-WS-4 4-WS-5	71.61	1.36	2.98	0	4.34		2.983092505	0	4.5471978
			72.19	2.43	4.56	0.468	7.46		4.162006038		
		4-WS-6	121.28	11.5	17.2		28.7		13.42177395	0	22.348353
		4-WS-7 4-WS-8	111.97	6.67 9.93	9.46	0	16.1 26.6		8.049070709		
Area 3			160.89		16.6			1	14.72320892	0	23.581917
		5-WS-1 5-WS-2	82.45	2.99	4.95 5.95	0	7.94		4.391642308 5.012591052	0	7.0903253
			177.08	3.03 6.94	10.6	0	8.98 17.5			0	7.6456009
		5-WS-3 5-WS-4	177.08	10.1	15.3	0	25.4		8.465779318 12.50789816	0.012497876	13.971225 20.672041
	Station 5	5-WS-5	241.2 348.89	0.386	0.952	0.175	1.51		1.249398753		
		5-WS-6	486.3	13.7	22.3	0.173	36		19.01018519	0.143009902	30.739619
		5-WS-7	396.3	5.65	8.73	0	14.4		8.094585653		13.226099
		5-WS-8	566.98	6.48	8.82	0	15.3		8.384774577		
		6-WS-1	326.37	3.62	12.1	1.54	17.3				
A === 4	Ctation C								10.88076625		
Area 4	Station 6		299.2	3.25	7.6	0.694	11.5		5.85343819		
		6-WS-3	140.4	1.77	2.69		4.46		2.248560963		
A 5	Charles 7	7-WS-1	526.57	1.35	2.05	0	3.4		2.031986001	0	3.3897063
Area 5	Station 7		348.65	2.27	3.09	0	5.36	2.27	3.09	0	5.36
		7-WS-3	453.59	4.72	6.72	0	11.4	4.72	6.72	0	11.4

#### PCB Accummulation in Carp

	Station	Replicate	filet wt (g)		File	et				Carc	ass		1	Whole Body Co	ncentrations	
				Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	carcass wt (g)	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs
	Ħ	6-C-1	407.81	8.66	12.9	0	21.6	3855.52	2.29	3.28	0	5.57	2.899324096	4.200203737	0	7.103354
	ar Š	6-C-2	305.16	2.05	3.04	0	5.08	1587.56	2.14	3.14	0	5.28	2.125489454	3.123877171	0	5.2477543
	Ξ	6-C-3	354.06	4.54	10.2	0	14.7	2494.75	11.3	25.1	0	36.4	10.45984372	23.24817626	0	33.703049
Area 4	Jew Jd)	6-C-4	566.99	5.02	11.8	0	16.8	3636.73	4.75	11	0	15.8	4.786417102	11.10790252	0	15.934878
AI Ca 4	6 (Ne	6-C-5	309.8	2.17	2.98	0	5.15	2721.55	7.88	10.7	0	18.6	7.296445478	9.91102611	0	17.225428
	n (	6-C-6	145.47	1.69	2.81	0.209	4.71	1147.37	3.5	6.12	0	9.62	3.2963393	5.747559713	0.023516622	9.0675282
	Static	6-C-7	89.5	1.4	2.13	0	3.53	680.38	4.12	6.18	0	10.3	3.803794877	5.709179872	0	9.5129747
	S	6-C-8	152.04	1.26	1.89	0	3.15	1133.97	2.27	3.26	0	5.53	2.150591597	3.098030186	0	5.2486218
	(a)	7-C-1	458.9	1.24	2.52	0	3.76	4460.59	4.44	8.37	0	12.8	4.141497513	7.824300141	0	11.95673
	a S	7-C-2	378.69	0.14	0.465	0.125	0.73	3061.74	0.327	1.23	0.309	1.87	0.306416808	1.145796034	0.28874702	1.7445196
	] gr	7-C-3	251.59	1.97	2.47	0	4.44	2381.35	6.11	8.12	0	14.2	5.714403215	7.580115498	0	13.267385
Area 5	Spriı	7-C-4	274.01	11.1	17.4	0	28.5	2608.15	22.1	33.6	2.11	57.8	21.05421836	32.05984886	1.909400068	55.014418
Alea 3	2 (S	7-C-5	206.42	0.0674	0.223	0.067	0.357	1927.75	0.157	0.518	0.14	0.815	0.148333759	0.489467175	0.132939335	0.7707016
	Eo	7-C-6	261.46	0.13	0.568	0.133	0.83	3401.93	0.177	0.792	0.188	1.16	0.173645561	0.776012884	0.184074592	1.1364476
	atic	7-C-7	339.53	0.0599	0.192	0.0457	0.298	2721.55	0.196	0.539	0.129	0.864	0.18090401	0.500511326	0.1197605	0.8012202
	22	7-C-8	376.47	1.09	2.29	0	3.38	2494.75	1.9	3.36	0	5.26	1.793794032	3.219703227	0	5.0134973